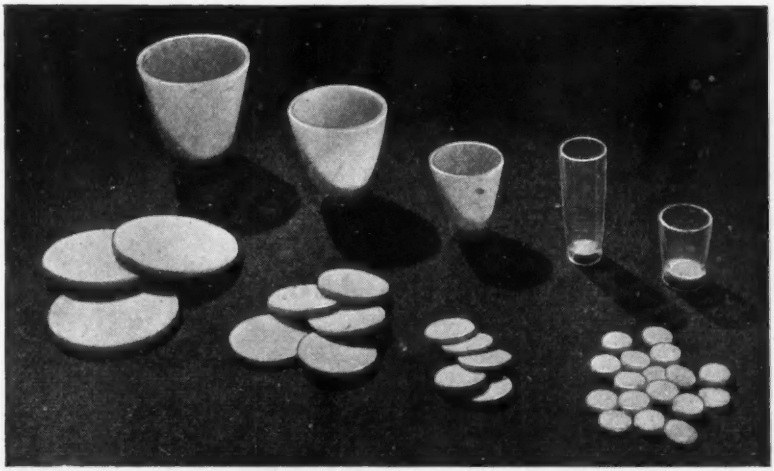
The Chemical Age

VOL LXIII 28 OCTOBER 1950 No 1633

INDEX TO ADVERTISERS IN THIS ISSUE



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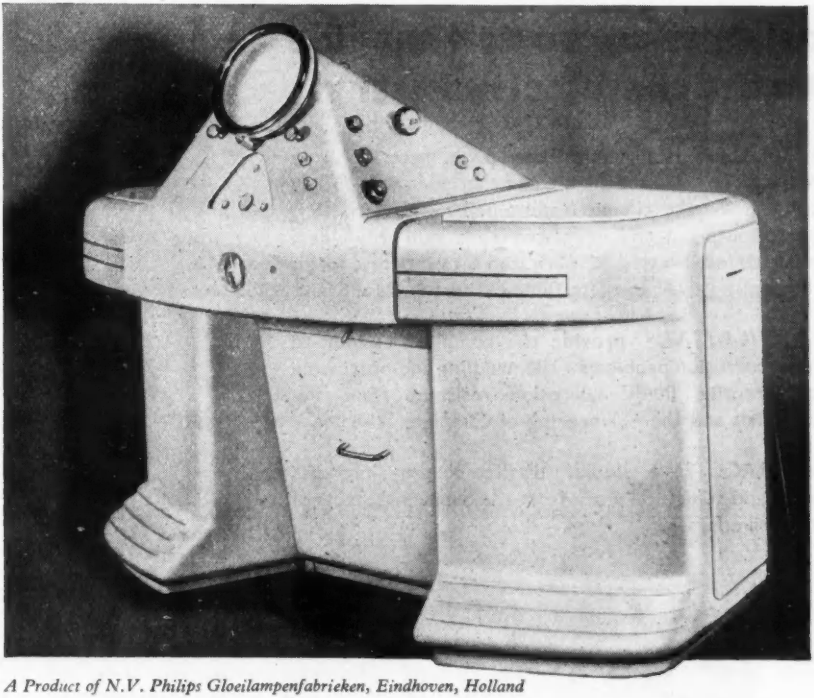

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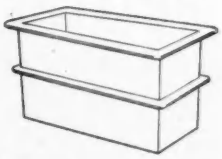

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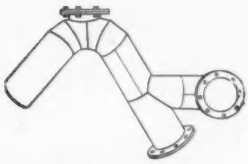

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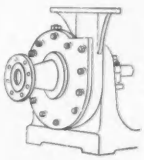

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The Weekly Journal of Chemical Engineering and Industrial Chemistry

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Hazards Undisclosed

IF there is a subject which deserves priority treatment to make at least the fundamentals known it is the serious one of radiation hazards in peaceful development of "atomic" techniques. Research workers in biology, biochemistry, medicine and, while rather fewer, in industry are using radioactive elements in steadily increasing amounts. This is a conspicuous tribute to the scale of development at Harwell in providing supplies and methods; but it is equally a challenge to all the radio-biological workers to make widely known the danger signs, the tolerance levels and the safeguards.

Large numbers of chemists, physicists, doctors and biologists are now being exposed, continuously or intermittently, to larger or smaller emissions of these penetrating radiations. Already in the U.S.A. more than one fatality has been reported. Here, happily, it can be said no life has been lost as a direct result of over-exposure. Even the reticence of the authorities for atomic energy development in the U.K. could not have concealed a matter so vital to other workers in that field. Some however, may have been disagreeably reminded by what has occurred in America that it is well to "Ask not for whom the bell tolls . . ." It remains vital for all who are using or likely to use radioactive material to know accurately the total permitted dosages, which the facts about the unfortunate first human casualties and extrapolation from animal experiments will establish.

The promise that much more may now be done to spread public information on this vital theme which some saw in the holding last week, in London, of a conference on "Biological Hazards of Atomic Energy" has turned out to be a hollow one, at least so far as immediate additions to the general fund is concerned. No adequate report of those discussions is possible; the commentary (page 600 of this issue) does not purport to be that. The organisers, the Atomic Scientists' Association and the Institute of Biology, held their meetings in private and disclosed no more than could be elicited by impromptu questions put forward at the Press "conferences" held at the conclusion of the two sessions. No summaries were issued (as for instance the Royal Institute of Chemistry issued for the Fermentation Conference last year) and no preprints. In this context, the list of titles of subjects discussed, which was made available, is to the majority not much more informative than a hieroglyph.

According to Dr. Catcheside, the

On Other Pages

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essence of the reported results on the effects of radiation may be summed up in this way. Radiation produces no new genetic effects, it merely accelerates existing genetic tendencies including the rate of mutation and the production of abnormalities. Of its more immediate biological implications, other speakers confirmed that the effect is destruction of tissue. The organism responds by more active growth which may then over-compensate the original destruction as in malignant cancerous growths.

We leave our readers to judge for themselves whether it is essential to have quickly a fair summary of the conclusion of the relevant papers, including details of character of radiation, time and dose. A final session of the conference was devoted to ethical and sociological issues. Wisely the organisers did not shirk these controversial—but so vital—issues, nor indeed should any scientist. And the thinkers who considered these implications for war and peace, were also themselves top-rank scientists.

The inadequacy of these and the few other revelations of the same scale of informativeness does, of course, not mean that the knowledge assembled in London last week on matters such as protective chemicals is to be permanently buried, like some radioactive waste at Harwell. It is in effect being placed in cold storage—apart from the fruitful effect of such exchanges as were made at the conference itself—pending publication by the organisers of the full texts. That, as Dr. Edward Hindle confirmed, will not be earlier than six months. Much can happen in six months and in the interval there will be no summaries or extracts.

An ironic commentary on this ill advised policy is the repugnance which most scientists feel—including several who expressed it at the conference—for the official secretiveness which surrounds atomic energy. Professor C. A. Coulson (professor of atomic physics, King's College, London), said he would not be associated with any policy of concealment. Professor Kathleen Lonsdale, F.R.S. (professor of chemistry at King's College), referred angrily to the withholding from her of facts about precautions in uranium mining. Such secrecy, she said, should have no part in a civilised community. With that, few will disagree and all will feel some disappointment that professional bodies, one, the biologists', of recent formation, should have perpetuated the "top secret" principle and involved to some extent the conspicuously candid British Association.

Notes and Comments

Yorkshire's Potash

HUNDREDS, besides the geologists, have waited for what may have seemed to them to have been an uncomfortably long time to hear of what was brought to light by the drills, which since the war have been probing in some places to depths of 5500 ft. or so, into the ancient evaporite beds of minerals beneath Eskdale and near Whitby. What Dr. Alexander Fleck has now disclosed so amply and explicitly to the Newcastle section of the Society of Chemical Industry outdistances in its promise of a rich yield of agricultural potash materials, sylvite (potassium chloride), sylvinite and some other forms, the optimistic guesswork of those who awaited the facts. Dr. Fleck and his organisation, I.C.I., Ltd., who have provided the stimulating facts about what was revealed in one Yorkshire site of about 12 square miles, would certainly resist any assumption at this stage that the great beds of potash salts lying amid the deep salt and anhydrite bands can certainly be made to yield up their wealth at an economic cost. Their intimate experience of the special hazards and costliness of chemical determination at 4-5000 ft. below the level of most laboratory benches will have ensured that they have not overstated the case. I.C.I. has spent around £170,000 on that research already. To those who have not experienced those sobering influences, however, some of the conclusions now advanced may afford a much more solid occasion for national celebration than, for example, the Festival of Britain.

"Enough for 140 Years"

THE salient facts given by Dr. Fleck are stimulating enough, even if one was not privileged to share the excitement which he admits affected all who saw "the great chunks of sylvite" which suddenly appeared in the cores from 3834 ft. in the first borehole in Eskdale, No. 3 at Sleights. While that Eldorado-like incident was certainly not the general experience while probing the depths around the Esk, the general summary contains plenty of considered estimates to quicken the imagination, such as Dr. Fleck's that within the particular small circle surrounding the I.C.I. and D'Arcy Exploration's boreholes there probably lies 213.5 million tons of sylvinite, of which 150 million tons should be 32 per cent KCl and the rest about half as rich. "A very appreciable addition to the natural resources of our country," is the conservative comment of Dr. Fleck, who notes that if 35 per cent of the deposits can be extracted, Eskdale alone should be able to support an annual consumption here of 500,000 tons of KCl for 140 years. It is a reasonable expectation that at some date very much earlier than 2090 chemists will have dealt effectively with the problem of making profitable the complex sulphate material, polyhalite, containing up to 15 per cent K_2O, in which it is thought that there is in Yorkshire at least as much potassium as in the sylvinite beds. Giving perspective to the whole picture revealed in these preliminary stages, Dr. Fleck says this:—

> "The upper bed of sylvinite stands comparison in both the thickness and KCl content with the average of the commercially worked beds. The KCl content of the lower sylvinite is probably as good as that of any commercially worked potash bed, while its thickness is only rarely exceeded. . . ."

September's Record Exports

THE disparity between the trend of United Kingdom export trade as a whole and the sustained rise in chemical sales, which made the record total of £10,202,561 in September, no doubt reflects to some extent the anxiety of many countries to provide against future needs before national requirements narrow or close the channels. Yet the rising market for chemicals contrasts strongly with the reduction in most other export groups. Provision could not have been made for

the greatly increased totals of nearly all the basic materials and of some large groups of manufactures, such as insecticides, had there not been widely distributed improvement in productive capacity, notwithstanding the impediments which have complicated the procurement of plant and finance. The £10.2 million compares with rather less than £7 million earned by chemical sales last year and £7.5 million in 1948. It is difficult to believe that world markets will continue regularly to take more than £10 million worth of chemicals month by month from Britain, and by no means certain that the disposal on that scale of some of the basic items would not shortly impose serious limitations upon the flow of essentials to our own using industries.

Widespread Changes

THE prudent verdict on a change of such magnitude in the pattern of British chemical trade with the rest of the world will probably reject the conclusion that a permanent departure has been made from the level of £6-8 million per month which had prevailed since the war. If it is in fact artificial and transient, the wide distribution of the current request for this country's chemicals is all the more remarkable. Practically all the Continental countries have contributed very largely to the higher totals and Norway and Denmark have increased their orders on an equivalent scale. British chemicals can be credited on that account with having smoothed the problem of financing the programme to liberalise European trade. As earners of dollars, chemicals in September achieved not only a record level—at $677,000—but surpassed any forecast, however optimistic, which might have been made 12 months ago. The dollar total then was little more than 134,000.

Controls Retained

THE expanded scale of distribution of British chemicals around the world, especially perhaps the fourfold rise in September shipments to the U.S.S.R., gives no support for the suggestion by the Lord President of the Council in Parliament this week that rearmament and stock-piling may oblige the Government to restrict the use of commodities. While one example of comparative abundance does not necessarily dismiss Mr. Herbert Morrison's argument for scarcity tactics, his and the Government's case for preserving emergency powers and controls is thought to have disguised a piece of opportunism. Unwillingness to relinquish its grip on trading in such things as the non-ferrous metals characterised Government policy long before heightened tension in world affairs offered some excuse for it. So the Supplies and Services (Transitional Powers) Act, 1945, is to be given a fresh lease of life. In developing the policies by which they have wrought so marked an improvement in our trading position industries will still have to serve to a large extent as agents—with the privilege of bearing all the risks and supplying the knowledge and initiative. Was the "bonfire of controls" really only an *ignis fatuus*?

Uncertain Coal Supplies

THE chairman of the National Coal Board, Viscount Hyndley, speaking at the Institute of Fuel dinner in London on October 19, said the prospective coal supply this winter was causing him some anxiety. He had hoped that by now the autumn production drive would be well under way and that the results would have been felt. So far he could not say this was so.

The Board had been working hard on a national plan which would cover the reorganisation of the industry over the next 15 years. It was an immense task, but he expected to have the plan ready for publication about the middle of next month.

Describing attempts to minimise wasteful use of fuel, Lord Hyndley said: "We have recently given very serious thought to the generation of electricity at the pithead. One of the main advantages of this policy is that it provides an efficient means of using the almost unmanageable and untransportable wet fines generally known as 'slurries.'

"The Board also take a lively interest in the activities of the Chief Scientist of the Ministry of Fuel and Power—Dr. Roxbee Cox. We are particularly interested in his efforts to develop gas turbines using either solid fuel or the methane contained in the upcast air from the mines."

U.S. METAL CONTROLS

Limiting Exports in the N-F Group

THE extension of the present U.S. policy of restricting certain strategic exports is reflected in a statement received here last week from the U.S. Department of Commerce. This regulation is one of the "destination controls" and relates to non-ferrous metals and manufactures, upon which there was earlier a restriction. Licences are now needed for shipment to any country, except Canada, of the following metals and products:—

Bauxite concentrates including alumina. Aluminium and aluminium-base alloys, ingots, slabs, pigs, blooms, and other crude forms scrap solids, scrap borings, turnings and dross, bars and rods (including rolled and extruded), aluminium foil and leaf (less than 0.006 in.), mill shapes, wire (except woven-wire insect screen cloth), perforated aluminium sheets.

Copper and manufactures, not elsewhere specified. Brass and bronze diestocks, shims, bearings and bushings. Lead manufactures, not elsewhere specified.

Zinc and manufactures: scrap, photo-engraving sheets and plates; sheets, plates and strips, not elsewhere specified; alloys, except brass and bronze; die castings; other forms, not elsewhere specified; zinc dust; battery shells and parts, unassembled; zinc manufactures, not elsewhere specified.

The Office of Industry and Commerce also announced that to prevent undue drain on domestic supplies, several non-ferrous metals will be licensed during the fourth quarter (October-December) on the basis of quantitative quotas. The groups concerned are broadly those now subjected to the destination licensing rule.

Strategic Purchases by Soviet Bloc

THE Milan Chamber of Commerce has drawn attention to the fact that many of Russia's satellites are procuring chemicals which might be useful in the event of war. *Il Tempo*, reporting this, says that purchases are at a very high level, some prices having increased ten-fold. Firms in Milan, Rome and Genoa are responsible for the exports, many of them working underground. Goods almost invariably pass through Trieste marked "Various merchandise" and usually involve glycerin, phenol, naphthaline and certain solvents essencial to the production of explosives. (Purchases by the Soviet Union of U.K. chemicals rose to £24,550 in September, compared with £6287 a year ago.)

ALUMINIUM RECORD

U.S. Raises Production and Imports

THE July output of aluminium in the U.S. was 63,518 short tons, the largest monthly total for six years. The U.S. Bureau of Mines, recording the increase, discloses that imports of aluminium to the U.S. in July were 17,620 short tons, an increase of 90 per cent over the June total. Receipts of crude aluminium from Canada in July were almost double the June total and imports from the United Kingdom were also increased.

An increase of 1.5 cents in the price of pig aluminium, to 18 cents per pound was recently announced by the Aluminium Co. of America, following a 10 per cent wage increase to its employees.

The price of cadmium in the U.S. has again, risen to $2.40 lb., an increase of 25 cents on the July price of $2.15. That, too, represented an increase of $1.50 on the war-time figure of 90 cents per lb.

Supplies of copper and zinc remain scarce; defence orders have increased. A strike of stevedores in Chile is threatening to hold up exports of Chilean copper to the U.S. There is also concern about a strike of coal miners at the American smelting and refining company's plant at Rosita, Mexico, and its possible effect upon the immediate supply of zinc.

Because of the dwindling stocks of lead, November lead orders are now chiefly taken on the basis of the average price prevailing at the time of shipment, and no longer at the fixed price of 16 cents per lb. The present price of lead is 17.85 cents per lb.

Rising Manganese Imports

IMPORTS of manganese, chromium and tungsten to the U.S. in the first six months of 1950 were well ahead of the 1949 rate, according to figures published by the Department of Commerce. The amount of manganese imported during that period was equal to 80 per cent of the total for 1949. Imports from Russia were negligible but India sent nearly twice as much manganese as in 1949. The Union of South Africa and the Gold Coast both exceeded their 1949 figures.

Imports of tungsten in the first six months of 1950 exceeded those of all 1949 by 27 per cent. Chrome imports during that period were about the same as in the first six months of 1949, a loss in Russian shipments being largely made up from Southern Rhodesia.

£10.2 m. EXPORT RECORD

Chemical Total Rises £1 m. in a Month

THE total value of chemical exports in September, including drugs, dyes and colours, at £10,202,561 was roughly £1 million higher than the July and August figures, and about £3 million more than in September 1949. It constitutes a record. Outstanding values, (the figure for the corresponding month of 1949 shown in brackets), were: ammonium sulphate £404,196 (£293,625); British West Indies took £109,090 of this total against none in September last year. Bleaching powder £22,179 (£13,484). Sulphate of copper £219,921 (£52,721), of which £23,742 went to Commonwealth countries; £4700 (nil) to the Irish Republic, £2614 (£2) to Italy and £1572 (nil) to Egypt. Of the disinfectants total of £353,330 (£229,867) £40,434 (£28,494) went to India, £21,442 (£7865) to Australia, and £31,351 (£5780) to Brazil. A large purchaser of sodium carbonate—total £371,109 (£144,521)—was Brazil £81,572 (£32,254). Caustic soda realised £579,710 (£238,535), of which India contributed £105,500 (£3), and Brazil £525,685 (£96,334). Typical totals were these :—

	Sept., 1950	Sept., 1949
Cresylic acid	Gal. 310,337	Gal. 112,206
Salicylic acid	Lb. 135,713	Lb. 373,315
Value of all other sorts of acid	£160,627	£119,562
Sulphate of alumina	Tons 3,009	Tons 2,397
Other aluminium compounds	1,739	627
Ammonium sulphate	20,911	15,677
Ammonium nitrate	2,308	2,221
All other sorts of ammonium compounds	1,459 Cwt.	1,775 Cwt.
Bleaching powder	17,246	12,430
All other bleaching materials	9,305	12,427
Collodion cotton	1,615 Tons	1,378 Tons
Copper sulphate	4,140 Cwt.	1,381 Cwt.
Disinfectants, insecticides, etc.	42,816 Tons	37,172 Tons
Fertilisers	1,304	1,016
Value of gases (compressed, liquefied or solidified)	£28,304 Cwt.	£20,057 Cwt.
Lead acetate, litharge, red lead,	17,722 Gal.	7,193 Gal.
Tetra-ethyl lead	162,876 Tons	154,260 Tons
Magnesium compounds	1,087 Cwt.	801 Cwt.
Nickel salts	7,824	3,625
Potassium compounds	7,870 Tons	4,352 Tons
Salt	22,209 Cwt.	18,456 Cwt.
Sodium carbonate	642,283	278,527
Caustic soda	437,026	206,406
Sodium silicate	34,110	40,095
Sodium sulphate	104,340	30,667
All other sodium compounds	110,627 Gal.	70,970 Gal.
Tar, creosote, anthracene oil	796,918 Tons	2,854,128 Tons
Zinc oxide	1,796	1,147
Total value of chemical manufactures (excluding drugs and dyestuffs)	£5,865,999	£3,455,547
Value of quinine and quinine salts	£49,005 Lb.	£49,855 Lb.
Acetyl-salicylic acid	235,076	165,190
Insulin	100 International Units 1,239,400	100 International Units 784,70

	Mega Units	Mega Units
Penicillin	1,299,839	848,451
Total value of drugs, medicines and preparations	£2,196,176	£1,565,692
Total value of dyes and dyestuffs	£942,700	£970,660
Total value of paints, pigments and colours	£1,197,686	£1,002,636
Total value of chemicals, drugs, dyes and colours	£10,202,561	£6,994,535
Total value of all plastic materials	£722,634 Cwt.	£445,064 Cwt.
Chemical glassware	1,401	1,318
Value	£45,017 Cwt.	£50,901 Cwt.
Fans	5,393	4,984
Value	£139,244 Cwt.	£145,196 Cwt.
Furnace plant	10,539	5,981
Value	£106,161 Cwt.	£70,183 Cwt.
Gas and chemical machinery	13,095	19,375
Value	£149,297	£284,272
Value of scientific instruments (optical)	£74,825	£85,029
Value of Thermometers, mercury in glass instruments, etc.	£31,966 Cwt.	£43,104 Cwt.
Air and gas compressors and exhausters	15,377	12,587
Value	£281,596 Cwt.	£275,163 Cwt.
Non-Ferrous Metals—		
Aluminium and aluminium alloys	95,085	88,120
Value	£1,117,312 Lb.	£1,065,730 Lb.
Bismuth metal (not including alloys)	61,807	1,331
Value	£44,536 Cwt.	£687 Cwt.
Brass and other alloys of copper, other than metal alloys	88,210	98,841
Value	£1,048,808 Tons	£904,282 Tons
Copper	6,985	8,508
Value	£1,454,959	£1,245,710
Lead ,unwrought, sheets, etc.	361	275
Value	£53,332 Cwt.	£48,548 Cwt.
Nickel and manufactures of	17,888	27,398
Value	£342,077 Cwt.	£315,241 Cwt.
Nickel alloys	2,737	3,24
Value	£52,448	£54,265
Value Tin, unwrought	£823,101	£316,972
Value Tungsten	£21,382	£15,676
Value Zinc	£113,231	£58,340
Total value of group	£7,342,027	£5,136,462

BRITISH AGRICULTURAL CHEMICALS

Expanding Test and Production Plant at Yalding

SOME impression of the debt which territories all over the world owe to British scientific and technical enterprise for safeguarding food crops emerged during the official inauguration at Yalding, Kent, last week, of the extended laboratories of Plant Protection, Ltd. (THE CHEMICAL AGE, *63*, 568).

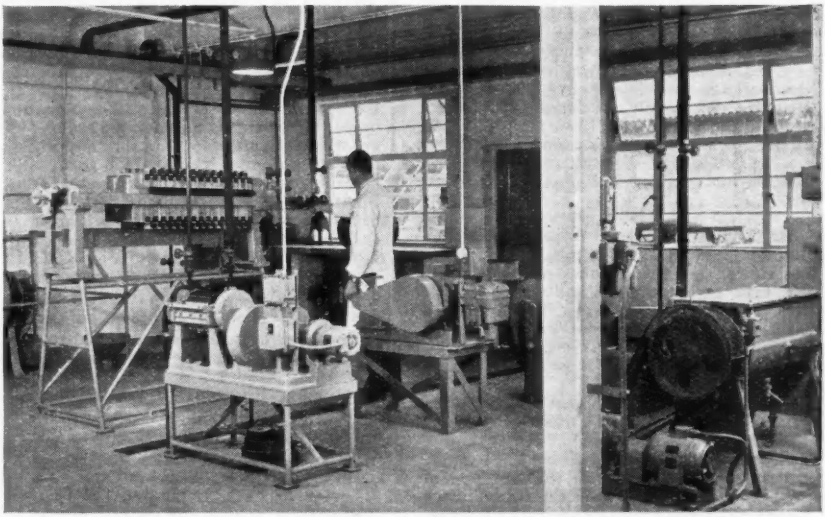
Mr. A. R. N. Roberts, a director, welcoming the Press and other guests, said the event symbolised the attainment of a new stage in the science and practice of crop protection. He described the part which Plant Protection, Ltd., had played in the fight against the Colorado beetle in this country and in combating the locust menace in Africa and the Middle East. Towards suppressing the latter, the British and Colonial Governments had guaranteed £1 million a year for three years.

Plant Protection, Ltd., was proud of the fact that Mr. O. B. Lean, the technical head of its biological research station at Fernhurst, had been summoned to an international conference in Iran to put his almost unrivalled knowledge of the locust problem at the disposal of the Middle East Governments.

Agrocide 7, based on benzene-hexachloride, the chemical most widely used throughout the world as an anti-locust bait, was devised in the Yalding Laboratories of Plant Protection, Ltd. To combat these and the many other pests and diseases which were denying man the full harvest of his labours, the mobilisation of all the resources of science was obviously imperative.

As one instance only of the growing need for this effort, Mr. Roberts mentioned that in the financial year which ended on September 30, exports, as represented by sterling and in tonnage had greatly exceeded those of any previous year.

In 1950, Plant Protection, Ltd., had concluded arrangements with the Chipman Chemical Co. in the United States for the manufacture of its products on the other side of the tariff barrier. Such additions to Britain's dollar earnings would be particularly welcome, but there



Part of the well equipped semi-technical laboratory at Yalding, showing (left) the filter press, drum dryer and homogeniser for emulsions. On the right is the powder mixer

were few countries of the free world in which the products of Plant Protection, Ltd., were not being used.

Sir Wallace Akers, I.C.I. director of research, who performed the official opening of the works extensions, said that in the world at large 700,000 different insects had been identified, and they were still being distinguished at the rate of about 7000 new species a year. A good many of these attacked plants, and the number gave some idea of the magnitude of the scientists' work.

He described the liaison between I.C.I., Ltd., and Plant Protection, Ltd. The manufacturing divisions of I.C.I. were constantly evolving new chemicals. Those which were believed to be of potential value in the control of plant pests and diseases, or of weeds, were sent to Plant Protection's agricultural research stations at Hawthorndale and Jealott's Hill, and the most promising then found their way to Yalding for determination of their probable application in agriculture on a commercial scale.

The largest and principal departments at Yalding are the grinding shed, the powder mixing shed and the emulsion department. The equipment of all these sections is represented in miniature in the present plant of the semi-technical laboratory, to which the extensions have been made. The most important function of this laboratory, however, will now be the development of new processes, and ample room has been left for the erection of new plants. Two dry stores, one for raw material and the other for finished experimental batches ready for field trials, as well as outside storage for barrels and drums, have been provided.

The opportunity has been taken to install steam, compressed air and vacuum services, and to supply these not only to the semi-works-scale laboratory but also to the new analytical laboratory and to the formulation laboratories.

The technical department at Yalding, in providing most of the chemical services to Plant Protection, Ltd., works in close collaboration with the I.C.I. divisions, notably with the dyestuffs, general chemicals and Nobel divisions.

Biological Hazards of Atomic Energy

THE view that the number of applications from industry for radioactive isotopes had been disappointingly small was expressed by scientists at the Press conferences held following the several sessions of the conference, in London on October 20 and 21, on the "Biological Hazards of Atomic Energy." The joint organisers were the newly formed Institute of Biology and the Atomic Scientists' Association with the support of the British Association.

"Disappointed"

Dr. Edward Hindle, who presided at the first of these Press meetings, summing up the views, said the isotopes were available if industry wanted them and was in a position to take and use them. There had, he said, been many cases of firms going to Harwell to inquire, and even setting up special laboratories, and then leaving the matter undeveloped.

At a subsequent Press meeting, in reply to a question from THE CHEMICAL AGE, Sir John Cockroft confirmed that although the Harwell authorities had been "to some extent disappointed" at the number of industrial firms who had taken advantage of the availability of isotopes, the number appeared to be growing satisfactorily. "We should, however, like to see the number increase enormously," he said.

Asked if the relatively few applications from industrial firms was influenced by the shortage and high price of the new equipment they would need, or by lack of technical knowledge, or all these things, Sir John Cockroft said it was a fact that the necessary equipment had been rather scarce, but that some firms appeared to be willing to spend the money if they could get the equipment. Bearing in mind the moderate number of industrial firms which had at present received deliveries of isotopes, or had at least made definite applications for them, he would not like to say there was a definite shortage of this equipment, but there might be some difficulty if the number of applicants increased as was hoped they would.

Sir John Cockroft said something had been done to provide industrialists with the technical knowledge desirable. A small group had been set up at Harwell to help them, and a training course for representatives of industrial firms on the use of radioactive isotopes in industry was shortly to be started.

Inquiry, after the conference, at the Ministry of Supply, elicited the following information about the latest figures of industrial firms which had taken advantage of available isotopes:—

Firms which gave orders for isotopes for

industrial use in May numbered 20; in June, 27; July, 47; and August, 53.

There were 429 deliveries in August of isotopes to industry. These included, mainly, 785 millicuries of phosphorus, 254 millicuries of radioactive iodine and a small amount each of carbon and cobalt.

Industrial consignments of isotopes are not usually of strong radioactivity; they are mainly between 10-30 millicuries per source.

At the Press conference following the morning session—which was devoted to "Biological and Medical Effects of Nuclear Radiations"—Dr. E. E. Pochin (Medical Research Council Department of Clinical Research, University College Hospital, London), who had given a paper on 'Control of Hazards and Irradiation in the Clinical Use of Radioactive Iodine," said scrupulous care was taken in the selection and screening of hospital personnel who were to handle the isotopes for clinical use and the related apparatus. Outside of the Hospitals similar care was taken.

Safeguards Adequate

In response to requests from Press representatives after the afternoon session on October 20, Professor W. V. Mayneord (Royal Cancer Hospital) briefly reviewed national and world organisation of protective measures against radiation hazards. They had arrived at certain basic amounts which could be tolerated.

Mr. W. Binks (National Physical Laboratory) said that of the personnel working in the atomic energy establishments in Britain, about 75 per cent were getting about a fifth of the radiation they could tolerate; this percentage was also true of hospital personnel, radiographers, etc. The radiation arose mostly through defects in machinery, but the level of hazard was still too low to necessitate any closer protective measures than were at present taken, and the need for "hospitalisation" scarcely ever arose.

Professor J. S. Mitchell (Department of Radiotherapeutics, University of Cambridge), who had previously given a paper on "Tolerance Levels for Fast and Thermal Neutrons", said the animation of fast neutrons from apparatus like cyclotrons could cause damage to the eye, such as an ordinary cataract, with, however, no impairing of vision. Only one such case had been seen here, but there had been several in the United States.

Statutory Control

Sir John Cockroft, in reply to further questions, said there was likely to be a new statutory committee of the Ministry of Supply which might, in course of time, make it compulsory to observe the general safety level of tolerance of radiation which had been arrived at. This level was already being very generally observed in industry.

Dr. J. Loutit (AERE, Harwell) said that thio-urea, some cyanide derivatives, and certain other biochemicals had been found to be protective against radioactivity if they were induced into the human body before exposure. The percentage of protection of these substances varied greatly, but generally speaking they afforded at present no more than 15-20 per cent measure of protection. The figure had been increased to 100 per cent under strict laboratory conditions, but all the substances which had been tried out in the laboratory were in themselves strongly toxic. Professor Back, of Liège, had done much of this experimentation.

Chalk River's Advanced Particle Accelerator

A NEW electrostatic accelerator, capable of producing emissions of charged particles of accurately defined energy and direction has been installed at the Chalk River atomic energy plant of the Canadian National Research Council. It will be the source of high speed particles for breaking up atomic nuclei and will be supplementary to the atomic pile.

The machine, which weighs 14 tons and operates at 4 million volts, was built in the radio and electrical engineering division of the National Research Council at Ottawa, in close collaboration with the inventor, Dr. Van de Graaff, of the Massachusetts Institute of Technology.

The initial experiment performed with the new machine was the disintegration of lithium by protons to produce neutrons and a radioactive beryllium isotype. As this reaction had been carefully studied in other laboratories, the experiment enabled the voltage developed by the Chalk River generator to be standardised. Work is now proceeding to concentrate the accelerated particles into a narrower band —of about .05 in. diameter. An extensive programme of fundamental research will then begin.

RIC EXAMINATIONS

Eight New Fellows

THE Royal Institute of Chemistry has announced the pass list for the examinations held in September. For the Fellowship there were eight successful candidates, as follows:—

Branch C: Organic Chemistry.—WILLIAM CHARLES GARRATT, B.Sc. (Lond.); GORDON WILLIAM NENDICK, B.Sc. (Lond.).

Branch E: The Chemistry, including Microscopy, of Foods and Drugs and of Water.—ELIATHAMBY CHINNARASA, B.Sc. (Lond.); HARRY POLKINHORNE, B.Sc. (Lond.); EDWARD JOHN ROLFE, B.Sc. (Lond.); WILLIAM CUTHBERT JOHN SMITH; ROBERT CLARENCE SPALDING, M.A. (Cantab.); RALPH EDWARD WESTON, B.Sc. (Lond.).

The 21 new Associates who qualified at the September examination were these:—

BARNES, Sidney Charles, College of Technology, Manchester; BARRETT, Ronald Leon, B.Sc. (Lond.), South-East Essex Technical College, Dagenham, and Wigan and District Mining and Technical College; BIRKETT, Leonard, Harris Institute, Preston; CARR, Arnold Ernest, Royal Technical College, Salford; DEARDEN, Jack, Royal Technical College, Salford; DUXBURY, Donald, Municipal Technical College, Blackburn; FARRAR, Sydney, Royal Technical College, Salford; FORBES, Derek Guthrie, B.Sc. (Lond.), GEORGE, Michael Rainforth, Municipal Technical College, Hull; GRINDELL, Clive, Municipal Technical College, Hull; LAMBERT, Edgar, Lancaster and Morecambe Technical College; MORTIMER, Miss Aileen Marion, University College of the South-West, Exeter; ROUT, Peter George, College of Technology, Liverpool; SCHOFIELD, Harold James, B.Sc. (Lond.), Municipal Technical College, Hull; STOTT, Alan Fowler, B.Sc. (Lond.), Royal Technical College, Salford; TOWLER, John, Robert Gordon's Technical College, Aberdeen; TURNER, Peter Harry, Central Technical College, Birmingham; TUTT, Derek Edward, Woolwich Polytechnic, London; VICKERS, Clive, Municipal Technical College, Hull; WILLETT, Eric Arthur, West Ham Municipal College, Sir John Cass College, and Imperial College, London; YOUNG, George Raymond, Municipal Technical College, Hull.

Toxicity of Polyethylene Glycols

INFORMATION developed during recent years upon the toxicological actions of the fluid and solid polyethylene glycols is summarised in an article appearing in the *Journal of the American Pharmaceutical Association*—Scientific Edition, *39*, 349 (1950). The authors, Henry F. Smyth, Jr., and associates of the Mellon Institute of Industrial Research, Pittsburgh, have re-interpreted and supplemented the information and present evidence in the report. Their conclusions confirm the earlier work indicating that acute oral toxicity, dermal toxicity and irritating properties of the polyethylene glycols are very low. The safe rat dose of Carbowax 1500 is now known to be substantially greater than originally reported, and of Carbowax 4000, slightly greater.

ANALYSTS' RESPONSIBILITIES

Advisor and Public Guardian

REGRET that the Ministry of Health was proposing to take the responsibility for bacterial examinations from the public analysts, who were well qualified for that work, was expressed by Mr. T. MacLachlan in the course of his lecture on "The Public Analyst and His Work" at a recent meeting of the London and S.E. Counties section of the Royal Institute of Chemistry.

The public analyst, he said, was a scientific advisor to his authority and was concerned among other things with the question of water purity, sewage, bacteriology of water and milk, and the causation of dermatitis by chemicals.

It was the duty of the public analyst to give unbiased reports without fear or favour. The adulteration of foods had, generally speaking, decreased—at least from 1893 to 1938—although there was some increase during the war years. Certain forms of contamination, such as lead in beer from lead pipes in public houses, the use of glycerin in so-called liqueurs, the "near beer" racket and the toxicity caused by, for example, the use of pentaerithrityl stearate as a fat extender (this oxidises in the body to oxalic acid) were mentioned.

The public analyst, however, was not out just to catch people but to assist the manufacturers to maintain high standards and even to suggest uses for materials not suitable as foods, etc.

Analytical Chemistry Congress

THE International Congress on Analytical Chemistry is to be held in Britain in 1952. Meetings will be held in Oxford, beginning on September 4, the technical sessions in one of the main university buildings.

Arrangements for the congress are being made by a general committee under the chairmanship of the president of the Royal Society, Sir Robert Robinson, O.M. The honorary treasurer is Sir Wallace Akers, C.B.E., and R. C. Chirnside, F.R.I.C., is the honorary secretary.

It is expected that a meeting of the board of Section V, Analytical Chemistry, of the International Chemistry will be held in Oxford during the same week.

Open Day at Steel Laboratories

The British Iron and Steel Research Association is holding an "open day" at its physics laboratories at 140 Battersea Park Road, London, S.W.11, on November 9 and 10.

Parliamentary Topics

GOVERNMENT buying of zinc must be continued at present owing to the limited amount of zinc available in world market, stated Mr. G. R. Strauss, Minister of Supply, in the House of Commons on October 23. The Minister, replying to questions by Mr. John Grimston, said discussions about reducing the forward premium recently imposed on raw copper had been taking place with the industry, but no alterative generally acceptable to consumers had been found. Further representations from the industry would be considered.

THE availability of cortisone for sufferers from rheumatoid arthritis was raised by Mr. Edward Evans. In reply, Mr. Herbert Morrison, Lord President of the Council, said an extensive programme of co-ordinated research on cortisone and related substances was being carried out under the auspices of the Medical Research Council and other bodies; adequate funds were available to develop the work. The question of providing cortisone for the routine treatment of patients was outside the council's province. Much more research was necessary, he was advised, before the drug could be safely recommended for general use in rheumatoid arthritis.

WINTER stocks of coal at the end of October would be about 400,000 tons short of the target, stated Mr. P. Noel-Baker, Minister of Fuel and Power in a written answer. In recent weeks the output of deep-mined coal had been less than estimated; the output of opencast coal had been reduced by heavy and continued rain. In consequence, stocks at the end of October were expected to be about 15,750,000 tons. To this must be added about 300,000 tons which, as the result of the summer prices scheme, were now in the consumers' cellars instead of in the coal merchants' stocks.

TOTAL gasification of nearly 200 tons of coal had been effected since the seam at Newman Spinney was ignited just over three months ago, stated Mr. P. Noel-Baker, Minister of Fuel and Power, in a written reply. The quality of the gas so far obtained was good and it was hoped that the experiment would ultimately lead to the commercial production of gas suitable for the generation of power.

INADEQUACY of pay for research scientists and workers engaged on atomic energy projects compared with opportunities available in private industry were raised by Mr. A. R. Blackburn. Mr. G. R. Strauss, Minister of Supply, denied that there was any great discrepancy. The pay of research scientists and workers in his Department was under continual review.

Commons Questions About Missing Scientist

THE disappearance of Professor Bruno Pontecorvo, a research scientist at Harwell atomic research station was the subject of questions in the House of Commons this week.

Mr. G. R. Strauss, Minister of Supply, said Dr. Pontecorvo was a senior principal scientific officer at Harwell, that he had been granted leave of absence on July 25 and was due to return on August 31. The professor had accepted and was shortly due to take up an appointment at Liverpool University.

Dr. Pontecorvo was born in Italy. In 1943 he became a member of the Joint Anglo-Canadian atomic energy team at Montreal and three years later was transferred to the Ministry of Supply atomic energy organisation, remaining in Canada until 1949 when he was posted to Harwell. He became a naturalised British subject in 1948. For several years Dr. Pontecorvo's contacts with secret work had been very limited.

[Professor Oliphant, now director of physical research at the Australian National University, said in Canberra that the doctor, while freely discussing his work had never mentioned to him any moral feelings about the atom or hydrogen bombs or political matters.

Although an associate of Fuchs, they were not engaged on the same work. Before his resignation from the research centre at Harwell he was working on advanced tests of nuclear physics research.]

" Discovering Airdrie "

The development of the chemical and pharmaceutical industries in Lanarkshire forms part of the current industrial exhibition of Aidrie. A new bitumen-bound rubberised material for floor covering is among the items displayed.

Potassium Salts in N.E. Yorkshire

by ALEXANDER FLECK, D.Sc., F.R.I.C.*

DRILLING for potash in England is by no means an easy, straightforward piece of work and, in addition to requiring skill, it is costly. The boreholes which have been put down cost about £45,000 each, and the expenditure so far incurred by I.C.I. for obtaining the cores and for their interpretation and proper storing is something of the order of £170,000.

It was the possibility of finding considerable quantities of potassium-containing brine that gave the justification to the I.C.I. to hazard the necessary expenditure. I should say at once that, considered as a search for potash-bearing brine, the exploratory boring programme has been a complete failure.

In the D'Arcy borehole at Aislaby, the deep brine containing potash was observed near the top of the Lower Permian limestone at a depth of 4800 ft. from the surface. But, owing to the expected dipping of the strata combined with a thickening of some of them, the top of the Lower Limestone of the Permian did not appear until a depth of about 5470 ft. had been reached. The limit of the drilling equipment being a depth of 5500 ft., only about 30 ft. of this limestone could be penetrated.

No Deep Brine

There was no evidence of the existence of deep brine, and if there is a brine reservoir in the area of this borehole it must be lower down in the unexplored thickness of the Lower Limestone. Since by the time the final depth had been reached it had become clear that the main objective in the investigation should be the further exploration of the salt beds in which substantial quantities of sylvite (mineral potassium chloride) had been discovered, it was decided to spend no further time at this stage on the search for potash brine.

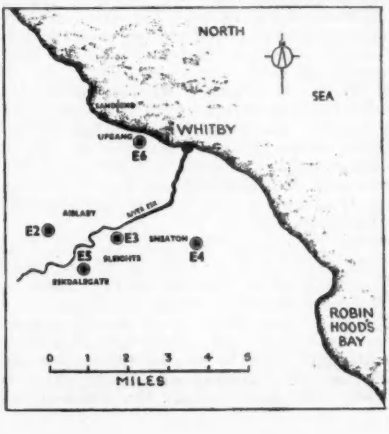
I should like to mention the interesting and quite unexpected discovery that at the base of the Keuper marls there is a bed of rock salt about 100 ft. thick. As is well known, the vast salt deposits of Cheshire and Lancashire are of Keuper age, but so far as I am aware Keuper salt has not hitherto been conclusively proved anywhere east of the Pennines. The salt deposits of Tees-side are unquestionably Permian.

With so few boreholes one cannot be absolutely certain, but our own view is that in the Whitby district the formations between the top of the Upper Limestone of the Permian and the top of the Lower Lias lie regularly and evenly one above the other throughout the area. This is not to say that the succession of strata within each formation was also regularly laid down. Unfortunately, this is not so. There is a strong temptation to conclude that here we have an example of a succession of even beds sloping gently towards the east and north.

The strata with which we are mainly concerned are the Permian evaporite beds which lie below the Bunter and from which they are separated by several hundred feet of Saliferous Marl. This formation is composed of a series of strata which change in a downward direction from marls alternating with sandstones to marl bands which are sometimes pure and sometimes admixed with particles of anhydrite. At the bottom of the formation is a thin band of anhydrite, about 2 ft. thick, and then a thin band of marl with rock salt inclusions. Below this comes what we have called the Upper Salt.

First Borehole

Our first borehole was Eskdale No. 3 at Sleights, the drilling of which was started on June 24, 1948, and ended on



* In a paper—of which this is an abstract—before the Newcastle Section of the Society of Chemical Industry, on October 17. It is reproduced in full in the society's journal, *Chemistry and Industry* (October 17).

March 16, 1949. Rock salt (halite) was encountered at a depth of 3598 ft. in the form of coarse crystals varying from colourless to flesh-pink. The cores continued to be composed of nothing but crystalline halite with occasional marl inclusions until at 3675 ft. the appearance of the cores changed dramatically—the flesh-pink halite being now mixed with irregularly-shaped blood-red coloured crystals which were quickly recognised as sylvite (potassium chloride), the colour being due to impurities.

After 22 ft. the sylvite crystals were no longer present, and from that depth until 3743 ft. there was nothing but halite with marl inclusions. A bed of anhydrite was found between 3743 ft. and 3769 ft., this latter depth representing the bottom of the upper evaporites.

Down to 3770 ft. the core recovery had been excellent, but for the next 47 ft. recovery was poor. The material recovered in the core barrel was largely red marl with bands of halite.

Mineralogical examination established the presence of carnallite in the marl. Carnallite ($KCl.MgCl_2.6H_2O$) is soluble in calcium chloride solution, and it was inferred that the marl bels *in situ* contained a substantial quantity of the mineral, which is so soluble that it is one of the last to be deposited in an evaporating sea.

Surprisingly, in view of what I have just said, the material in the strata immediately below the Carnallite Marl was halite and not a potash salt—flesh-pink halite just as in the Upper Salt. Then suddenly, at a depth of 3834 ft., sylvite appeared in obviously considerable concentration among the halite—great chunks of it that caused much excitement to all who saw them—especially since this went on for over 30 ft. before the cores were once more composed of halite only.

Analysis revealed that the average KCl content over this thickness is at least 40 per cent and perhaps as much as 45 per cent. At 4142 ft. anhydrite bands began to alternate with halite, the latter persisting until 4192 ft. Over the next 8 ft. the anhydrite became more and more dolomitic, the top of the Upper Limestone being reached at 4200 ft., by a coincidence almost exactly the same depth as in the Eskdale No. 2 borehole which the D'Arcy Company had drilled at Aislaby.

A summary of the strata encountered in Eskdale No. 3 borehole is given in Table IV.

In these lower evaporite beds the rock was so hard that coring became too laborious and expensive to continue, and even straight drilling became a very slow process. The total thickness of rock salt is estimated to be 470 ft., and that of mixed polyhalite anhydrite to be 449 ft. In the latter the polyhalite content varied from nearly pure material to mere traces.

TABLE IV

Eskdale No. 3 Borehole—Lower Evaporite Beds

Between			
4383 ft.	and	4424 ft.	rock salt with some anhydrite
4424 ft.	,,	4496 ft.	rock salt
4496 ft.	,,	4556 ft.	banded rock salt and anhydrite
4556 ft.	,,	4772 ft.	anhydrite with some rock salt
4722 ft.	,,	5097 ft.	polyhalite with anhydrite
5097 ft.	,,	5226 ft.	polyhalite and anhydrite with increasing amounts of rock salt
5226 ft.	,,	5464 ft.	rock salt with some anhydrite and with dolomite near base
5464 ft.	,,	5478 ft.	Dolomitic marlstone and anyhdrite
5478 ft.	,,	5500 ft.	Dolomite limestone

For Eskdale No. 3 borehole one can say with confidence that in the Upper Salt, between the depths of 3675 ft. and 3697 ft., there is a 22 ft. bed of sylvinite (a physical mixture of halite and sylvite crystals) containing 15 to 18 per cent of KCl by weight; and that in the Middle Salt, between 3834 ft. and 3865 ft., there is a 31 ft. bed of sylvinite containing 40 to 45 per cent of KCl. The potassium chloride does not disappear below the depths of these two beds, but persists down to the bottom of the salt beds to the extent of between 1 and 3 per cent. There was no evidence of potassium chloride in the Lower Salt.

TABLE III

THICKNESSES OF THE DIFFERENT STRATA AT THE VARIOUS ESKDALE BOREHOLES

Borehole	E.2	E.3	E.4	E.5	E.6
Location	Aislaby	Sleights	Sneaton	Eskdalegate	Upgang
Height above O.D.	403 ft.	43 ft.	265 ft.	240 ft.	78 ft.
Formation			*Thickness in feet*		
Drift and Estuarines	—	—	352	—	128
Upper Lias	50	—	228	45	232
Middle Lias	260	43	230	100	220
Lower Lias	929	1027	808	913	780
Rhaetic	61	68	55	71	64
Keuper Marl	890	995	880	984	900
Bunter Sandstone	1090	1087	1002	—	1146
PERMIAN					
Saliferous Marl	375	378	476	—	308
upper salt	185	145	114	—	180
anhydrite	20	26	28	—	26
marls	60	48	40	—	55
middle salt and anydrite	276	383	239	—	243
Upper Limestone	117	183	—	—	—
bottom salt, anhydrite, polyhalite	460	1081	—	—	—

According to published information, the average KCl content of the deposits worked in the Western Zone of Germany is not more than 20 per cent, the beds varying greatly in thickness but frequently being less than 10 ft. thick. The results I have quoted, therefore, lead to the view that if the two sylvinite beds in Eskdale persisted with comparable thicknesses and KCl content over an area of, say, 10 square miles, this district could claim to possess potash deposits among the richest, though perhaps also the deepest, potentially workable deposits so far discovered. Even on a more pessimistic outlook there was ample encouragement to sink more boreholes, and this we proceeded to do.

One borehole (Eskdale No. 4) was sunk near the village of Sneaton, at a point two miles due east of No. 3. Drilling started on May 5, 1949, and ended on November 1, 1949. The depth reached was 4458 ft., drilling being stopped when it became certain that the Upper Limestone had been entered.

The top of the Upper Salt was found to be at a depth of 4031 ft., and the cores obtained below that depth were predominantly flesh-pink or red-brown halite, thought there were some bands with a considerable content of red marl. Between 4080 ft. and 4095 ft. was a bed of sylvinite, which on sampling and analysis was declared to be a thickness of 14 ft. 4½ in., containing an average of 9.65 per cent KCl. Below this bed was more halite, anhydrite coming in at 4145 ft. and the bottom of the anhydrite forming the base of the Upper Salt bed being found at 4173 ft.

As in No. 3 borehole. the next formation was Carnallite Marl, which extended from 4173 ft. to 4213 ft.

At No. 3 borehole the Carnallite Marl lay above 17 ft. of halite. At No. 4 there was only a 4½ in. band of halite and then, at 4213 ft. 4½ in., sylvinite appeared again. But as the cores came to the surface it became increasingly evident that in the Middle Salt at this borehole we had found not one bed but a series of thin ones. Four distinct bands of sylvinite can be recognised, the intervening bands being rock salt containing a little KCl and variable quantities of marl in which the Geological Survey detected carnallite.

Going downwards, there are 12 in. containing 37 per cent KCl; 12 in. containing 3 per cent; 25 in. containing 60 per cent; 45 in. containing 4 per cent; 120 in. containing 38 per cent; 120 in. containing only 2 per cent; and 58 in. containing 38 per cent.

These compositions I have just quoted are in round numbers, and the weighted average composition of the total thickness of 32 ft. 10 in. between the bottom of the Carnallite Marl (4213 ft.) and the bottom of the lower of the four sylvinite beds (4245 ft. 10 in.) works out at 24.68 per cent KCl. Below this was halite again, with small but diminishing traces of KCl, and at 4330 ft. it was decided that it was too dangerous to continue coring owing to the ever-increasing amount of caving of the borehole wall.

Summarising the results from this borehole, therefore, one may say that, as at No. 3 borehole, two groups of sylvinite beds had been shown to exist, one in the Upper Salt and one in the Middle Salt. Admittedly, neither of them was so rich in potash at Sneaton as at Sleights, but it was still a good deposit as potash deposits go.

The geological evidence seemed to suggest that at Sneaton one might be at or near what was the shore of the evaporating sea that had produced these Upper Permian evaporites, and that rather than go still further east with our next boreholes we should go north or south of the West/East line joining E.2, E.3 and E.4. And so we decided to do both at once.

Accordingly, Eskdale No. 5 borehole was started at Eskdalegate, which is a little over a mile south-west of Eskdale No. 3 borehole at Sleights, and Eskdale No. 6 borehole was started at Upgang near the seashore between Whitby and Sandsend and 2½ miles NNE. of Eskdale No. 3. Drilling of No. 6 started on March 20, 1950, and ended on August 14, 1950. No. 5 was started on April 4, 1950, and is not yet completed.

Depth of Upper Salt

The first of these two boreholes to strike the Permian evaporite beds was Eskdale No. 6 borehole at Upgang. The top of the Upper Salt was found to be at a depth of 3778 ft. Sylvinite was encountered in a composite bed between 3867 ft. and 3895 ft., a bed made up of five bands rich in sylvite and with intervening bands of halite containing less than 10 per cent KCl. On sampling and analysis the average KCl content over the depth of 28 ft. came out at 19.6 per cent. Thus at Upgang the sylvinite bed in the Upper Salt is outstandingly thicker and richer in KCl than at either of the other two boreholes.

Below 3895 ft. the halite continued, containing only traces of sylvite, until anhydrite appeared at 3958 ft., followed by the Carnallite Marl at 3984 ft.

At Eskdale No. 6 borehole: The Middle Salt followed immediately below the Carnallite Marl at a depth of 4039 ft. There was halite for about 4 ft., and then came the first sylvinite.

It is a pity that we had to take small diameter cores at this particular place and thus were unable to get really high core recovery. Only 9 ft. came out of the 10 ft. core containing the first of the sylvinite, and only 7 ft. 6 in. came out of the next 10 ft. core. The bottom 6 ft. of this latter was halite and no more than traces of potash were present in the halite cores which followed.

At 4215 ft. streaks of anhydrite started to appear, and a little deeper bands of anhydrite alternated with halite. The core from the depths 4274 ft. to 4282 ft. consisted of very dolomitic anhydrite. It was therefore certain that the Upper Limestone was being aproached, and the further exploration of this borehole was accordingly ended.

Uncertain Analysis

Because of the incomplete core recovery in the sylvinite zone we cannot say for certain how much thicker than 7 ft. is the sylvinite bed in the Middle Salt at Upgang. We choose to infer that the missing portions of core were sylvinite, and that in fact the sylvinite bed has a thickness of 12 ft.

We cannot either be certain of the average analysis of the bed, but I can say that the average KCl content of the sylvinite cores that were recovered is 30.6 per cent. Even at the most optimistic reckoning, therefore, we must conclude that the sylvinite in the Middle Salt at Upgang is considerably thinner than at the other two boreholes.

Eskdale No. 5 borehole at Eskdalegate was started some weeks after the Upgang borehole, and progress has been considerably delayed.

What has so far been discovered about the existence of potassium chloride in the Whitby district can be fairly simply summarised. Table V states the averaged data for the sylvinite beds.

It is clear from this table that there are very considerable variations, both in thickness of the potassium-containing strata and also in KCl content.

TABLE V

Borehole	E.3 Sleights	E.4 Sneatin	E.6 Upgang
Sylvinite zone in Upper Salt—			
Thickness	22 ft.	14 ft. 4½ in.	28 ft.
Av. KCl content ...	15/18%	9.7%	19.6%
Sylvinite zone in Middle Salt—			
Thickness	31 ft.	32 ft. 10 in.	12 ft.
Av. KCl content ...	40/45%	24.7%	30.6%

Practically all our attention has been directed to finding what we can about Eskdale deposits, and much remains to be done before a detailed geological correlation with other deposits can be suggested. It has been clear from the beginning that geologically there is no connection with either the sylvinite deposits of Alsace or the sylvinite and carnellite deposits of Spain.

The real interest is in a comparison with the Permian evaporites of Germany and Russia, because the Eskdale deposits can be said like them to have been formed during periods of evaporation of an arm or arms of the Zechstein Sea.

The German potash deposits lie in two distinct fields. The more extensive is the Main Basin stretching from west of Hanover in the British Zone of Occupation to east of Magdeburg in the Russian Zone. The other deposit is in the River Werra district, in the U.S. Zone and to the south of the Main Basin, and is called the Hessen-Thüringen Basin. These two deposits are both of Permian age, but are held to be non-contemporaneous.

Comparison with Hanoverian Deposits

It is worth looking at a typical section of evaporite beds in the Hanover area shown side by side with the section of the evaporite beds in Eskdale No. 3 borehole. It is difficult to escape the suggestion that between the two sections there exists at least a superficial resemblance.

Might not the Riedal Seam of sylvinite ore correspond to the sylvinite in the Upper Salt in Eskdale, and the Ronnenberg sylvinite to the sylvinite in the Middle Salt? And might not the potash in the Lower Salt have been deposited as KCl when the KCl in the Stassfurt seam was deposited, and afterwards been converted by chemical action into polyhalite?

I am on safer ground when I turn to a comparison between the Eskdale and other potash, deposits in relation to depth, thickness of seams, form and concentration of potash salt.

The biggest known potash field is in Germany. In the Main Basin the evaporite beds are in general at such depths (about 10,000 ft.) as to be unworkable, but pressure effects, it is generally believed, on the plastic salt masses have forced up some of the beds near to the surface in the form of domes and saddles. It is the sides of these that are mined in the Hanover district, the almost vertical seams being reached by means of mine shafts varying between 2000 and 3500 ft. in depth.

At least half the material mined is sylvinite from the Riedal and Ronnenberg seams, which vary between 13 and 100 ft. in thickness, while the hartsalz of the Stassturt seam is worked in thicknesses ranging from 6 to 132 ft. The average KCl content of the material mined differs from mine to mine, being anything from 19 per cent to 36 per cent.

We can therefore conclude that by comparison with deposits at present commercially worked in other countries the Eskdale deposits lie appreciably deeper than the deepest. On the credit side, however, we are able to set the following:—

1. There are two undoubtedly workable beds of sylvinite, and sylvinite is the easiest of the commonly occurring potash-bearing ores from which to obtain potash in a marketable form. A point I have not previously mentioned is that the sylvinite in both beds has only a small percentage of magnesium salts.

2. These two beds of sylvinite are apparently lying nearly horizontally and are not contorted steeply.

3. The upper bed of sylvinite stands comparison in both thickness and KCl content with the average of the commercially worked beds. The KCl content of the lower sylvinite is probably as good as that of any commercially worked potash bed, while its thickness is only rarely exceeded in any known potash field.

Conclusions

From the evidence so far, what conclusions can be drawn about the magnitude of the Eskdale sylvinite deposits? The data are admittedly scanty, and any estimates made now are given with all reserve.

Linking the findings from three completed I.C.I. boreholes with the evidence for the existence of potash obtained from the D'Arcy Exploration boring at Aislaby (Eskdale No. 2), it seems reasonable to consider the minimum potash-bearing area as being that enclosed within a circle on the circumference of which are Eskdale No. 2, No. 4 and No. 6 boreholes, Eskdale No. 3 being not far from the centre of the circle. The area of the circle is about 12 square miles. I want to emphasise again that the sylvinite beds are all in the region of 4000 ft. deep.

In doing a calculation to determine the total amount of KCl which these borings have uncovered, it is necessary to make a number of assumptions regarding average values and average thicknesses, and anyone biased in an optimistic direction would use bigger figures than a person of a pessimistic turn of mind.

So far as our calculation is concerned, we cannot claim great accuracy, but I can assure you we have endeavoured to be neither optimists nor pessimists, but realists. Our own estimate is that in the Upper Salt there are 20 ft. of sylvinite containing an average of 17 per cent KCl, and in the Middle Salt 25 ft. with an average of 32 per cent KCl. On this assumption the calculated quantity of KCl in the Upper Salt is 63.5 million tons and in the Middle Salt 150 million tons, a total of 213.5 million tons. For the purposes of forward thinking, I think we are wise if we use a figure of 200 million tons— a very appreciable addition to the natural resources of our country.

Let me add that I believe that there is in existence much more than that. We have no evidence that our boreholes all lie on the edge of the deposits. I am of opinion that I have given adequate evidence to show that we have a worth-while field worthy of being converted into a commercial undertaking.

No doubt some of you will be already turning over in your minds what is the next step to bring these deposits into commercial operation, but there I must ask to be excused from saying anything further at present. Many important things will have to be thought of—such important questions as to whether mining technique has to be used, or whether solution methods can be employed similar to brine methods—these questions can only be answered after much thought and considerable experimentation. If we assume for the purposes of our present computations that 35 per cent of the deposits can be extracted we have 70 million tons, and even assuming an annual United Kingdom consumption of 500,000 tons of KCl it would appear that we have so far uncovered enough for 140 years.

Polyhalite

My remarks have so far been concerned almost entirely with potassium chloride. I would, however, draw your attention to the obviously vast quantities of polyhalite disclosed in the Lower Salt bed by the two borings, at Sleights and Aislaby, that have so far pentrated into these strata. Polyhalite is a complex sulphate mineral containing 15 per cent of K_2O when pure, and is relatively insoluble in water.

We believe that there is at least as much potassium as polyhalite as there is in the sylvinite beds above, but we have not yet got adequate data on the characteristics of the deposits.

HEAT TRANSMISSION PROBLEMS

Work of Sheffield Research Team

WHETHER, in heat transmission methods, sufficient recourse is made in practical design to those measures which serve to close the well-known gap between the development of fundamental criteria and their use in actual practice was questioned by Professor R. J. Sarjant, principal of the Sheffield University department of fuel technology, in the course of his delivery of the 1950 Melchett lecture. There was, for example, scope for a better understanding of the significance of turbulence. Dr. S. I. Evans had given attention to the combined effect of turbulence and radiation from gaseous combustion products flowing in tubes.

An experimental arrangement was illustrated by Dr. Sarjant in two diagrams, one of which related to a recirculatory system of preheated air, and the other to the use of the direct products of the combustion of town gas with varied additions of carbon dioxide to enable radiative effects to be studied. After passing through a calming section the gases were investigated in a length of 8 ft. of actual 3-in. boiler tube, surrounded with a sectioned water calorimeter coil.

The many interesting features which had emerged from this work would be apparent in the report which would be published in the near future; meanwhile, it was interesting to note that by inserting in the tubes spiral turbulence promoters of various pitches, expressions had been obtained from which might be predicted the effect on the heat transmsson and pressure drop of a controlled pattern of turbulence.

Thus, if the path of the hot gases were defined in terms of the geometry of the spiral motion, and allowance is made for the radiation from the surface of the promoter, the increased heat transmission was a function of this increased path length according to the following expression:—

$$\frac{h^1_c}{h_c} = \left(\frac{G^1}{G}\right)^{0.8} = \left(\frac{\sqrt{C^2+\rho^2}}{\rho} \cdot \frac{A}{A-lb}\right)^{0.8}$$

where h^1_c = heat transfer coefficient by convection with the promoter, B.Th.U./sq. ft./hr. °F.
h_c = " " " for the empty tube.
G^1, G = corresponding mass velocities, lb./sq.ft./hr.
c = circumference of tube, ft.
ρ = pitch of promoter, length of one turn, ft.
A = cross-sectional area of tube, sq. ft.
l, b = cross-sectional length and thickness of promoter, ft.

A relationship was shown in terms of convection heat transfer, h_c; the pressure drop, Δp; the Reynolds number and the pitch of the promoter. The result was in keeping with observations made in the experimental combustion chamber, and was shown to be in line with fundamental theory. In the measurement of gas radiation the experimental error, by reason of the small diameter of the tube, prevented more than tentative conclusions.

In the experiments so far carried out, correlation of the results obtained with those derived by the aid of Hottel and Egbert's curves indicated that better agreement could be achieved by using as the effective mean gas temperature the logarithmic mean of the technical bulk temperatures of the gas, rather than the sum of the logarithmic mean temperature difference and the surface temperature, as used by the American authors. To settle the point, similar experiments with larger tubes were called for.

Furnace Heating Problems

In the more complicated field of furnace heating the heat transmission problems were much more complex, the boundary conditions often being more difficult to define and the character of the flow of heat was usually variable. Again, knowledge of thermal constants might be uncertain as, for example, in regard to the latent heat of materials at high temperatures, and the constants themselves might vary with temperature, as in the thermal diffusivity of steel.

The methods formerly in use included techniques based on conventional solutions of the fundamental differential equation of heat conduction[1], and more recently machine analysis[2,3]. Specialised machines were necessary for the purpose, and naturally had their limitations, although it was fortunate that there was available the first prototype of a machine based on an electrical analogy. To extend, therefore, the means of approach in some of the problems which had received attention, numerical methods of integration had been studied.

Improved techniques had been developed, and were described in a paper[4] in which his (Dr. Sarjant's) colleagues C. Hulse and P. H. Price took part. (The Third and Fifth Plant Engineering Conferences on the Design and Operation of Mill Furnaces convened by BISRA.) The principle used was based on the introduction of suitable approximations for the

differential coefficients in the basic conduction equation. This was effected by replacing them by finite differences chosen to suit the problem. The integration was then carried out stepwise in a system of intervals of temperature and time in a suitable mesh or network.

In heating practice the times of heating used had for the most part been the result of empirical trial and error. For example, in soaking pit and reheating furnace practice, little was known of the standard of temperature saturation required for a specific type of steel or condition of rolling, nor was there any certain knowledge in existence of the temperature conditions inside an ingot between casting and charging, whereby the time of testing required in the soaker could be scientifically predicted.

The methods suggested were capable of being applied to those and a multitude of other problems, where the saving of fuel could be considerable. They were also applicable in the complex problems of furnace design, a subject which was receiving both theoretical and practical attention from the Sheffield research team.

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[4] (a) R. J. Sarjant, and C. Hulse; Proc. 3rd Plant Engineering Conference, page 27 (*BISRA*, May 1949). (b) C. Hulse, P. H. Price and R. J. Sarjant; Proc. 5th Plant Engineering Conf., page 15 (*BISRA*, June 1950).

Stresses in High Pressure Plant

OPERATING conditions in high pressure plant were the subject of a paper delivered recently in Manchester by Professor D. M. Newitt, president of the Institute of Chemical Engineers, to the North-Western branch.

Discussing problems of systems condensed under pressure involving highly-stressed plant, the professor forecast the operating conditions in the future. High-pressure chemical plant, he said, was divided into two parts, the compressor and the cylindrical reactor, and the pressures were greater than the critical pressures of the substances treated. The stress in a compressor, for example, on the piston, was uniform and uniaxial; in a cylinder there were two tensile stresses and one compressive. The pressure was limited by the design either of the piston or of the cylinder.

Application of pressure to the outer wall of a cylinder was a clumsy but effective method of increasing the allowable pressure in a cylinder, but there was no remedy for a lack of strength in a piston. Theoretical work on hydrostatic pressures causing an increase in the compressive strength of materials had been confirmed and had an obvious application to the design of pistons, although a large hydrostatic pressure was necessary to make an appreciable contribution to the compressive strength.

Manning extended the theory of autofrettage to the overstrain of materials beyond the usual limit of $2\frac{1}{2}$ per cent in the bore layer of a cylinder up to an overstrain in the outer layer of the cylinder, but there was no information on the stresses on release of the overstraining pressure.

Vessels overstrained to the outer layer must have lateral support to provide stability, therefore they were conical in shape and were forced into one or several external conical sleeves for which the provision of correct angles was important.

Pressure-volume relationships with reference to reaction velocities in the liquid phase were discussed. Most liquid phase reactions were favoured by pressure, often to a degree beyond that predicted by theory. The fact that there was such an increase in the viscosity of a compressed liquid that, at 12,000 atmospheres and room temperature, the liquid behaved as a plastic solid did not alter that.

Progress at Fawley

A REPORT from the Anglo-American Oil Co., Ltd., indicates that the "peak period" has been reached in the building of Europe's largest oil refinery at Fawley, Hampshire. Over 4000 men are now engaged on the project. Among them are more than 700 pipe fitters and pipe fitters' mates and over 300 welders.

Other statistical data are on the same vast scale. Several of the main refinery units which will convert imported Middle East crude oil into 5.5 million tons of petroleum products are now structurally complete. When finished, at the end of 1951, the refinery will embody 100,000 tons of steel, 300 miles of cast iron, steel and concrete pipes, 200 miles of electrical wiring and 100,000 cubic yards of concrete.

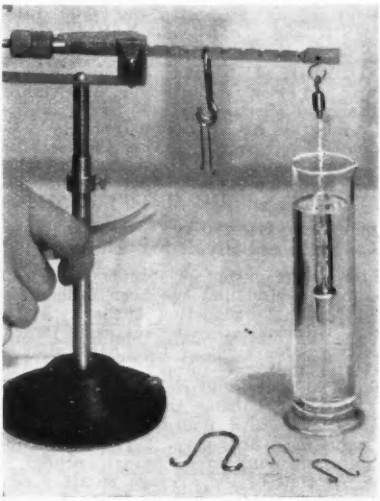
A NEW Spg BALANCE

High Degree of Accuracy

A NEW balance designed to determine the specific gravity of liquids with an accuracy to the fourth decimal place has been produced by the Central Scientific Company, Chicago, U.S.A.

Determinations are made by immersing a glass plummet of known weight and volume in the liquid and measuring the loss of weight due to the buoyant effect of the liquid. The actual weight of the plummet in air is 15 g., which includes the weight of the platinum suspension wire, and it displaces 5 g. of distilled water at 15° C. It encloses a sensitive thermometer for making temperature corrections. There are eight rider weights and a 15-gram hook weight, for use in levelling the balance.

In use, the 15 g. hook weight is suspended from the hook at the end of the beam. The balance is adjusted to equilibrium by levelling screw in the base and is calibrated by immersing the plummet in distilled water at 15.5° C. and placing a rider weight on the hook with the plummet. The reading is then of a specific gravity of one. When the plummet is immersed in an unknown liquid, the riders are arranged in the notches of the beam to bring the balance to equilibrium, and the reading is taken in the order of the largest to smallest weight, the figure on the beam indicating the integer.



ELECTRON MICROSCOPY

U.S. Reduces Instrument Cost

THE availability of the electron microscope to most laboratories, schools and industrial plants in the U.S.A. is indicated by the announcement by the Radio Corporation of America of a new 30-in. high table model which will sell for less than $6000. This is about one-third the price of RCA's larger Universal model and employs permanent magnet lenses which require no adjustment. It is 20 times as powerful as the best optical microscope, its limit of resolving power being 100 Angstrom units, which is sufficient for many applications in electron microscopy. It has a useful depth of focus, to 10 microns, which is about 150 times that of the light microscope. Useful magnifications up to 20,000 diameters are provided by photographic enlargement. Direct electronic magnification up to 6000 diameters is possible, depending on the lenses employed. The accelerating potential is 50,000 volts.

A time-saving feature of the new model is that specimens may be inserted into the evacuated column, or removed, without breaking the vacuum.

Promising U.S. Synthetic Enzyme

ARMOUR Laboratories, Chicago, Illinois, is undertaking an accelerated research programme to increase production and to define the usefulness of Tryptar, the brand name for the synthetic equivalent of a body enzyme, which, it has been disclosed, has the power to dissolve dead tissue and other protein in wounds and infections, without affecting living tissue. The company will undertake to manufacture sufficient quantities of the enzyme to enable selected clinics to determine the exact value of the material, which will be supplied to investigators free of charge.

Tryptar is a high purity crystalline trypsin, an enzyme produced by the body in the pancreas. It is an organic catalyst, whose function is to break up into amino acids the protein part of food.

The most promising use of the enzyme is in the treatment of tuberculosis empyema.

New U.S. Sodium Cyanide Plant

A new chemical plant to be erected by E. I. du Pont de Nemours at Memphis, Tennessee, will cost $7.5 million and occupy a 225 acre site It is expected it will be completed by the end of 1951 and will employ 180 persons. Sodium cyanide will be the chief product.

Technical Publications

AROMATIC solvents which readily dissolve many types of rubbers, chlorinated rubbers, waxes, and natural and synthetic resins are described in the latest leaflet (No. 4A) issued by Petrochemicals, Ltd. These solvents 23-5, 25-7 and 23-9 are high-boiling mobile liquids obtained from the Catarole petroleum cracking process. They have a narrow boiling range, are heat and light stable and available in commercial quantities. This range of products provides excellent solvents for insecticides and herbecides such as DDT, BNC90 and pentachlorophenol. They are less dermatitic than mineral oils of similar b.p.

* * *

THE quartz plate as used for the frequency control of radio transmitters is a device requiring extreme precision in its preparation. The manufacture of such plates, especially in mass production, is an interesting problem. How the required cuts are obtained is the subject of an article by W. Parrish in "Philips Technical Review" (Vol. II, No. 11), monthly publication dealing with investigations of the Philips Industries.

* * *

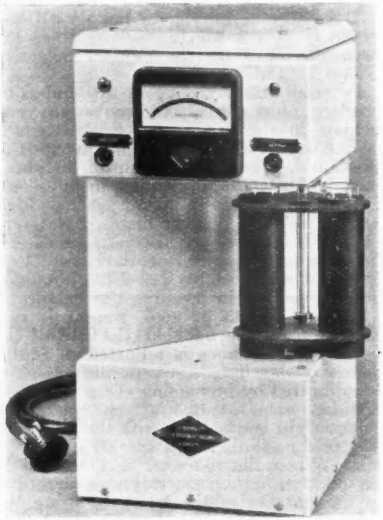
ADVANTAGES of extrusion processes are set out in the 1950 edition of "Designing with Aluminium Extrusions," an illustrated book (138 pp.), published by Reynolds Metals Co., Louisville, Kentucky. The volume is concerned with eight principles of design. An important feature of extrusions is the ability to produce parts which interlock, using dovetail, contour, snap or sliding fits for assembly. The tabular section presents 16 tables of data on chemical, mechanical and physical properties of aluminium, and extrusion process data such as minimum thickness, maximum lengths, tolerances, etc.

* * *

HISTORICAL associations of some ubiquitous metals are given in "Zinc and Spelter" published by the Zinc Development Association. These "Notes on the Early History of Zinc," by J. M. Dawkins, are said to be "compiled for the curious," but make a timely appearance when world supplies of zinc are causing some concern.

* * *

A NEW consolidated list of the imports licensing regulations at present in force (Notice to Importers No. 401) has been issued by the Board of Trade. Chemicals, drugs, medicines, dyes and colours, etc., are detailed under Group 5.



[By courtesy of Edison Swan Electric Co., Ltd.

The Filtrol photo-electric absorptiometer for the rapid routine measurement of fine suspensions and colours in liquids. Measurement is facilitated by four interchangeable colour filters

MOLYBDENUM as an alloying element forms an essential constituent of a number of special purpose and non-ferrous alloys. Its addition for increasing corrosion resistance, improving elevated temperature strength, etc., is described in "Alloy Metals Review" (Vol. 8, No. 57) published by High Speed Steel Alloys, Ltd., Widnes.

Stainless Steel for Defence

THE entire output of stainless steel containing columbium has been ordered by the National Production Authority of the U.S. Government to be set aside for the defence programme. This hard alloy is used mainly in equipment for use in chemical and industrial processes.

An order cutting the consumption of rubber was also issued by the National Production Authority. The reduction limits consumption of natural rubber to 75 per cent of the average monthly consumption in the 12 months ended June 30.

OVERSEAS CHEMISTRY AND INDUSTRY

NEW PRODUCTS AND HIGHER OUTPUTS

Fresh Progress in German Chemical and Oil Industries

THE production of most chemical products in Western Germany has undergone a further big increase since the holiday season. The demand, swelled by a genuine expansion of consumption, was raised further by replenishing of stocks, especially by buyers of dyestuffs, paints, lacquers, and soaps and washing agents. The call for basic chemicals has also increased, but not to such a marked extent.

In the export trade, great hopes are entertained for an expansion of shipments to non-European destinations, following successful negotiations with Mexico and Iran, both of which countries displayed special interest in buying German chemical products. An agreement has also been signed with Yugoslavia, but this has aroused less enthusiasm because West German exporters will have to bear part of the financial risk themselves.

Although the West German chemical firms would like to resume their traditional exchanges with East and South-east European countries, the various difficulties obstructing East-West trade have so far proved a great handicap.

Attempt to Exclude the West

Commerce with Eastern Germany is hampered by the accumulation of large West German balances on the East-West clearing account. Reports from Saxony-Anhalt make it clear that the leading chemical firms there, now all under the control of the Government or the Soviet occupation authorities, are making a deliberate effort to replace West German basic and intermediate products by substitutes of their own. The East German Government has taken steps to avoid overlapping of pharmaceutical production programmes of different factories.

The Leuna works have started the production of a number of new preparations, including Optal (n-propyl alcohol). Algamon (containing solicylamide) and Antiphytin (containing thioformol, an organic polysulphide compound). An adrenaline substitute is made by VEB Pharma factories at Dessau and Berlin. Farbenfabrik Wolfen is leading in Eastern Germany in the production of dyestuff intermediates formerly obtained from Western Germany; the substitution efforts made here have led to the production of several new blue dyes.

Under the Five-Year Plan the Leuna works is to double its motor fuel production—100,000 tons according to the latest reports—and to raise output of nitrogenous fertilisers from synthetic ammonia to 90 per cent of the total production in Eastern Germany—*i.e.*, about 210,000-220,000 tons (N) a year—by 1955.

Artificial Fibres

A very substantial increase in production is also proposed for lactams from which Perlon is made at Schwarza, Thuringia. Laboratory work on the manufacture of polyacryl-nitrile fibres is officially stated to have been almost completed; their commercial production is to be undertaken before long. Earlier work on the production of cellulose triacetate for the insulation of cables has been taken up by East German research workers and is reported to have developed to the stage at which it could be applied commercially

In Western Germany a growing number of firms report that they are able once more to supply the full range of pre-war products. Thus Röehm & Haas GmbH, Darmstadt, has regained the 1938 turnover, although some of the installations at Darmstadt were damaged in air raids, the works in the Eastern zone has been lost and a factory in the French zone is in the hands of the occupation authorities. Several new products in the field of pharmaceuticals and plastics are reported in course of development.

Farbwerke Hoechst will shortly put on the market a series of polyvinyl alcohols graded as to polymerisation and hydrolysis characteristics. Henkel & Cie., Düsseldorf, which only recently, after an interval of 11 years, reintroduced into the German market its Persil washing powder in an improved quality, is adding to its range of adhesives. The latest product in this field is Oleton, a material to impart resistance against weathering to outdoor paints. Riedel-de Haen AG, Seelze, near Hanover, has resumed the production of stearates.

The West German oil refinery output rose to a monthly average of 305,000 tons in the July-September quarter, more than

twice as much as in the corresponding period of 1949. Over 200,000 tons of crude oil more than in the April-June quarter of this year were treated. Part of the increase is due to the opening of a 600,000-ton oil refinery by BP-Raffinerie AG, a subsidiary of the Anglo-Iranian Oil Co., at Hamburg-Finkenwerder. The new refinery includes a 300,000-ton cracking plant, the biggest yet available in Germany.

Esso Standard AG, the German subsidiary of Standard Oil (New Jersey), is now operating a refinery with a throughput capacity of 560,000 tons at Hamburg-Harburg and intends to extend this to 700,000 tons a year. Construction of cracking facilities at this refinery is scheduled to begin in 1952; their prospective capacity is put at 400,000 tons.

The hydrogenation plants at Wesseling and Gelsenberg are now also dealing with substantial tonnages of crude petroleum. Cracking plants are to be erected by Erdölraffinerie Emsland at Lingen, Union Rheinische Braunkohlen-Kraftstoff A.G. at Wesseling, Deutsche Vacuum Oel AG at Bremen, Deutsche Erdöl AG at Heide, Holstein, and by Ruhrchemie AG at Oberhausen-Holten.

If all these projects are carried out, Western Germany will possess a cracking capacity of 2 million tons, in addition to the refinery capacity of 4.7 million tons to be reached by 1952.

GROWING EXPORT LISTS

AN examination of trade agreements recently concluded by Western Germany shows that chemical exports are again playing an important role in the country's foreign trade structure.

For instance, the new trade agreement with Poland provides for the export of chemical and pharmaceutical products valued at U.S.$4 million. Poland is to supply certain chemical raw materials, such as resin, casein for technical purposes and as medicinal herbs, valued at U.S.$320,000. It is interesting to note that Germany's proposed chemical exports rank second among main classifications of goods to be supplied, machinery coming first, with U.S.$10 million.

A one-year trade agreement with Italy envisages exports of German chemical and pharmaceutical goods worth about U.S.$5 million. The main totals in this group are (in U.S.$ thousand): creosote oils (300), sodium sulphate (100), fine chemicals (150), special solvents (450), dyestuff intermediates, including beta-naphthol (300), auxiliary products for the tanning and textile industries (150), other chemical products (600), pharmaceutical chemicals (500), pharmaceutical intermediates (200), pharmaceutical specialities (1000).

Italian chemical and allied products to be sent to West Germany includes among other materials (U.S.$ thousand): sulphur (500), borates (100), phosphorus compounds (50), tartaric and citric acids (50), celluloid (80), talcum (200), other chemicals (400), raw bauxite (200), ferro-silicon (350), colours for the glass and ceramics industries (200), glues (200), photographic gelatins (500), and shellac (50). Persia also is to receive German chemicals under a one-year trade agreement.

PAKISTAN STANDARDS

THE establishment in the near future of a Pakistan Standards Institute at Karachi has recently been announced by Pakistan authorities in London.

The Government of Pakistan, in consultation with various organisations in Pakistan and abroad, has prepared a scheme which has generally been accepted by the Provincial Governments, States, chambers of commerce and other industrial and technical organisations in Pakistan. The Standards Institute will function under the control of the Director-General of Supply and Development.

The proposal to establish a central Standards Institute in Pakistan follows from the recommendations of the First Industries Conference held in Karachi in December, 1947, which expressed the view that "the trend of modern industrial development indicates the supreme value to the country of standardisation."

The Institute will be managed by a general council consisting of representatives of the Central Government, Provinces, commercial and industrial interests in the country. It will be divided into these seven sections: Civil engineering; mechanical engineering; electrical engineering; glass and ceramics; chemical engineering; (a) chemical producing industry (sulphuric acid, caustic soda, and fertilisers), (b) chemical conversion (petroleum products, hydrogenated oils, soaps), (c) chemical processing (paper and plastics); textile and jute; packing materials.

Thus seven sectional committees will be set up to prescribe standards for their industries and also to consider the revision of standards, keeping in view the growth of industry, consumer needs and advancement of scientific technique.

OVERSEAS

Niobium Deposit

Niobium has been found in an abandoned iron mine at Fen Feild near Wefoss, Norway.

German Carbon Black?

The Hydrocarbon National Corporation of Berlin (Russian zone) is reported to be planning to manufacture carbon black from methane gas.

Nitrocellulose: Celluloid

The French *Journal Officiel* has published an Order in Council making it obligatory for plastics with a base of nitrocellulose to be declared as celluloid when such plastics contain 15 per cent or more camphor, and as gelatinised celluloid when the material contains under 15 per cent.

Petroleum By-Products

The French Standard Oil Company is now operating petroleum by-product plants in the South of France. Solvents are being produced at Marseilles and Port-Jerome, weed killers and similar products at La Meilleraye, and detergents and anti-freeze products by the Standard Kuhlmann de l'Estaque. This plant was intended to produce synthetic oils but has had to abandon production owing to difficulty in material supplies.

Polystyrene Plant for Brazil

The chemical division of Koppers Co., Inc., Pittsburgh, will co-operate with a newly organised Brazilian company, Companhia Brasileira de Plastico Koppers, in the construction and operation of a plant near Sao Paulo which will produce about 3 million lb. of polystyrene plastic annually. The new company is also to purchase from Koppers styrene monomer. Compounding and colouring of the plastic will be carried on in the Brazilian plant, which will cost about $500,000.

S. African Expansion

Industrial Chemical Products S.A. (Pty.), Ltd., Johannesburg, has completed construction of a new plant at Lilianton, Boksburg, to be used for the production of industrial, metallurgical and agricultural chemicals and various chemical specialities. The products are manufactured under American licences and patents. The new plant will replace an old factory at Booysens, Johannesburg, which the company has been operating since 1939 and, starting next month, will ultimately increase production five-fold.

Marshall Aid for Morocco

Marshall Aid funds will be used to develop the lead and zinc mines at Zellidja. Some 1400 million francs will be invested in the scheme.

Detergents to be Manufactured in Cuba

A plant for the manufacture of synthetic detergents is to be set up in Cuba by the Procter and Gamble soap organisation. The plant, for which an initial investment of approximately C$2 million has been announced, will probably be in operation by September, 1951.

Urea Plant for Japan

A modern urea plant is to be constructed in Japan by the Chemical Construction Corporation, New York. A contract covering the engineering designs has been signed with the Nissin Chemical Co., Osaka, one of the largest chemical producers in Japan.

Italian Sulphate of Ammonia Project

The Marshall Plan Administration has agreed to the construction of a sulphate of ammonia factory at Bagnoli for the Societa per l'Industria e l'Elettricita. Funds will also be provided for the construction of a synthetic ammonia plant for Montecatini which will make use of the natural gas of the Po area. Cost of these constructions will amount to $34 million of which $16 million will be provided by U.S. funds.

W. Germany's Chemical Plant Exports

According to recently published statistics, Western Germany exported in the first half of this year plant machinery and apparatus for the chemical and allied industries valued at $3.390 million, machinery for the pharmaceutical industry valued at $40,000; for the manufacture of paint, soap and candles worth $327,000 and for the rubber and plastics $805,000.

New Franco-Belgian Copper Project

The Cie. Générale d'Electrolyse du Palais has been established in Paris with a share capital of Fr. 200 million to engage in the manufacture of electrolytic copper. The new company has been formed jointly by French and Belgian mining and metallurgical interests, including the French Cie. Générale du Duralumin et du Cuivre, the Cie. Française des Métaux, and the Tréfileries et Laminoirs du Hâvre; and the Belgian Union Minière and its subsidiary, the Société Générale Mètallurgique de Hoboken. It will lease the electrolytic plant near Limoges.

PERSONAL

MR. W. M. COOPER, formerly manager of engineering of Monsanto Chemicals, Ltd., and at present assistant to the managing director, has accepted the post of assistant director of the general engineering department of the Monsanto Chemical Co., U.S.A. Mr. Cooper originally joined Monsanto as a chemical engineer at the John F. Queeny plant at St. Louis in 1935. He subsequently played a major part in the construction of the Texas City styrene plant. He joined Monsanto Chemicals, Ltd., in 1946, to form and take charge of the project engineering department which built the Newport factory.

The Melchett Medal for 1950 of the Institute of Fuel has been presented to PROFESSOR R. J. SARJANT. After graduating in chemistry, he worked with Professor W. A. Bone as his research assistant on investigations into the constitution of coal. In 1918, Professor Sarjant was appointed to the research department of Hadfields, Ltd., Sheffield, as the first fuel technologist studying specifically the fuel problems of the iron and steel industry; he became a local director of the company in 1937. He was appointed to the chair of fuel technology, University of Sheffield, in 1947.

MR. G. H. NOORDHOF has been appointed a lecturer in the department of education of the International Wool Secretariat. He has carried out research in physical chemistry for the DSIR.

MR. A. P. C. CUMMING has been elected to a Salters' Fellowship for research in chemical engineering during the year 1950-51.

The John J. Carty gold medal and award of the U.S. National Academy of Sciences go to DR. IRVING LANGMUIR, who recently retired from the post of associate director of the General Electric Research Laboratory, Schenectady, New York. He received the Nobel prize in chemistry in 1932.

Tightening Export Control

A new order by the Board of Trade requires that from October 31 molybdenum compounds and sodium azide for export to all destinations will require licences. From the same date potassium tetroxide and thallium bromo-iodide for all destinations outside the Commonwealth and the U.S.A. will also be subject to export licensing.

GELATIN & GLUE RESEARCH

THE composition of hide and the changes produced by the action of alkalis were discussed by Dr. J. H. Bowes, of the British Leather Manufacturers' Research Association, in a paper which he read at the second meeting of the research panel of the British Gelatine & Glue Research Association. Dr. Bowes dealt with recent work on the amino-acid composition of collagen, the interpretation of titration, the effect of alkaline treatment of collagen, and the swelling of collagen in alkaline solutions.

A second paper, by Mr. A. G. Ward, director of research of the association, dealt with recent studies of high polymers in relation to the properties of gelatin and glue. Methods developed for the determination of molecular weights were reviewed and their applicability to gelatin and glue were considered. Mr. Ward discussed theories of degradation of high polymers.

Obituary

DR. SAMUEL SUGDEN, professor of chemistry at University College, London, died suddenly on October 20 at the age of 58. He was educated at the Royal College of Science and became a research chemist to the Royal Arsenal, Woolwich. In 1919 he was appointed lecturer in chemistry at Birkbeck College, London. He became reader in physical chemistry at the college in 1928 and four years later professor of physical chemistry. He retained this post until 1937.

The death has occurred at Greenock of MR. ROBERT GRAHAM, Glasgow, director and manager of T. and H. Smith, Ltd., manufacturing chemists, Virginia Street, Glasgow. Mr. Graham, who was 71, joined T. and H. Smith, Ltd. as a traveller in 1900, became manager in 1919, and was elected to the board of directors in 1932. He was at one time chairman of the Scottish Wholesale Druggists' Association.

The death was reported last week of PROFESSOR RICHARD STANFIELD at his home in Edinburgh at the age of 87 years. He was recognised as an authority on heat engines. At the early age of 26, the professor was appointed Professor of Engineering at the Heriot-Watt College, Edinburgh, a post which he retained until he retired in 1929. He was largely responsible for the lay-out and design of the engineering laboratories in the college.

HOME

Cheaper Platinum

The price of platinum in London on October 18 was reduced to £27—£33¼ an ounce.

Dearer Copper Sulphate

The export price of U.K. copper sulphate was raised on October 18 by £2 12s. 6d. to £62 15s. per ton f.o.b. This increase is the fifth within a few weeks.

Highest Coal Output Since May

Production of coal in the U.K. last week was 4,378,400 tons compared with 4,335,500 tons in the previous week. Although this was the highest output since the week ended May 20, it was below the figure for the corresponding week of 1949.

Steel Prices Amended

A Ministry of Supply order amends the maximum prices of a limited range of iron and steel products from Tuesday this week. Principal increases are in the maximum prices of quenched rods and upholsterers' spring wire.

Tax Relief for Perfumery Materials

The Commissioners of Customs and Excise, after consultation with the trade associations, have decided that concentrated perfumery essences (either simple or mixed), which are free from vehicle or diluent such as ethyl alcohol, shall not be chargeable with tax unless put up for toilet use. This relief will apply also to floral absolutes and floral concretes supplied in the same conditions.

Southport Oil Search Continues

The D'Arcy Exploration Company, which has been exploring Southport foreshore for oil, on October 20 asked a corporation committee for permission to make two borings, one at Ainsdale and the other at Birkdale. They told the committee that they are sure there is oil near where borings are proposed, and that the bed may extend seawards. Drilling, if allowed, will continue until next Spring.

Duty on Light Oils

Proposals which have been submitted to the Treasury are intended to overcome the administrative difficulties said to have prevented a remission of the tax on the light hydro-carbon oils. This was announced at a meeting of the industries concerned held in London last week. It was also agreed to continue pressure for the removal of the tax and to seek an interview with the new Chancellor of the Exchequer.

Cheaper Wolfram

Quotations for wolfram were lowered by 5s. on October 17 to 230-240s. per unit.

New Scottish Sales Office

A new sales office in Glasgow to handle all its products in Scotland has been opened by F. W. Berk & Co., Ltd. The address is 65 West Regent Street, Glasgow, C.2. Telephone: Douglas 8338.

Grecian Chrome Ore

The Ministry of Supply announces that Grecian chrome ore is now available in refractory 1st quality, basis 40 per cent at £11 15s. 6d. per ton delivered *ex*-ship and £12 13s. 6d. *ex*-store.

New Dundee Laboratories

The chemistry department of Dundee University College has been redesigned and extended to cover a wider range of industrial chemical investigation. The new laboratories were officially opened last Monday.

Aluminium Export Licences

The Board of Trade announced last Monday that from October 27 individual export licences will be required for the export of aluminium or aluminium alloy goods valued at less than £180 per ton, compared with £150 announced on July 5.

Labels No Longer Taxable

The Treasury has exempted from liability to purchase tax labels, tags, gummed seals and other marking tickets. The exemption applies to such articles, whether unprinted, partly-printed or fully-printed and whether made of paper, fabric, metal, plastic or other material.

Tin Touches £918

New records for tin were established during the week on the London Metal Exchange, cash prices reaching £888 a ton on October 18, rising a further £8 10s. on October 19 and attaining a new peak of £918 a ton on October 24, cash price in the closing session being £914-£916. The extreme scarcity of immediate supplies was again manifest.

Steel Mill Records

Two new records in steel production have been set up by the Lanarkshire Steel Company in their mills at Motherwell. In one week the rolling mill turned out 5138 tons of steel. The previous record, set up in April, was 5050 tons. The cogging mill's output, 6206 tons, was also a record. The company is one of the 92 scheduled for nationalisation in February next year.

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

DURAZONE CO., LTD., London, N., chemical manufacturers. (M., 28/10/50.) September 27, debenture, to P. P. Rodoacanachi & Co., London; general charge. *Nil. July 31, 1949.

INDUSTRIAL CHEMICALS, LTD., London, W.C. (M., 28/10/50.) September 29, £1000 debentures, part of a series already registered. *Nil. July 22, 1949.

INDUSTRIAL SALVAGE, LTD., London, W. (M., 28/10/50.) September 25, £3000 (not ex.) debenture, to M. W. Dennes, Shipham and others; general charge. *Nil. October 12, 1948.

JEWELL PLASTICS, LTD., Sandwich. (M., 28/10/50.) September 26, £3000 debentures; general charge.

PARTINGTON INDUSTRIAL ESTATES, LTD., London, W. (M., 28/10/50.) September 19, mortgage (supplemental to a trust deed dated May 17, 1949, securing secured loan stock of Petrochemicals, Ltd.) securing an amount equal to the aggregate of all moneys then owing by the company to Petrochemicals, Ltd., plus £75,000; charged on land and buildings at Carrington, with fixed plant, machinery, etc.; also September 19, mortagage (supplemental to a trust deed dated December 30, 1949, securing second secured loan stock of Petrochemicals, Ltd., and a premium of 5 per cent) securing an amount equal to the aggregate of all moneys then owing by the company to Petrochemicals, Ltd., plus £75,000; charged on land and buildings at Carrington, with fixed plant, machinery, etc. *£4,300,000. January 13, 1950.

PETROCHEMICALS, LTD., London, W. (M., 28/10/50.) September 19, mortgage supplemental to a trust deed dated May 17, 1949; charged on Victoria College, Eccles, fixed plant, machinery, etc., and certain shares; also September 19, mortgage supplemental to a trust deed dated December 30, 1949; charged on Victoria College, Eccles, fixed plant, machinery, etc., and certain shares. *£4,300,000. May 23, 1950.

D. RILEY, LTD., Liverpool, chemists. (M., 28/10/50.) September 22, charge, to Barclays Bank, Ltd., charged on 65 William Henry Street, Everton. *Nil. Aug. 4, 1949.

TOOL TREATMENTS (CHEMICALS), LTD. (formerly PROPERTY OWNERS' MUTUAL SERVICES, LTD.), West Bromwich. (M., 28/10/50.) September 29, £1070 debenture, to County Estates (Derby), Ltd.; general charge.

Increases of Capital

The following increases of capital have been announced: LIFEGUARD PRODUCTS, LTD., from £10,100 to £40,000; VALENTINE WOOD, LTD., from £100 to £2000; ASHILL DISTRIBUTORS CO., LTD., from £15,000 to £40,000; HAPPE PRODUCTS, LTD., from £25,000 to £30,000; ARTHUR H. COX & CO., LTD., from £60,000 to £150,000.

Company News

The Ketton Portland Cement Co., Ltd.

Profit for the year of the Ketton Portland Cement Co., Ltd., was £71,332 (£72,648 a year ago). Profits tax and income tax accounted for no less than £101,575. This item exceeded the available net profit by £30,000. A final dividend of 10 per cent on the ordinary shares is proposed, making 15 per cent for the year, with a bonus of 2½ per cent on the ordinary shares. A balance of £99,780 is carried forward.

Light Metal Tools

MINISTRY of Supply statistics relating to U.K. production, imports and consumption of light metals in August include the following (in long tons):—Virgin aluminium: production 2353, imports 9996. Secondary aluminuim: production 6904. Aluminium scrap arisings 7381, consumption 9087. Aluminium fabrication 15,748, foil 847. Magnesium fabrication 307. Production and imports of virgin aluminium were both less than a year ago when the figures were, respectively, 2571 and 20,418.

New Companies Registered

Charles Bedeman, Ltd.

Private company. (485,760). Capital £1000. Manufacturers of detergents, emulsions, disinfectants, etc. Directors: C. N. Bedeman, 11 Lindsay Road, Hampton Hall, Mdx.; and L. W. Romp, 122 Peckham High Street, S.E.15. Reg. office: 122 Peckham High Street, S.E.15.

Chemicals and Plastics, Ltd.

Private company. (486,416). Capital £200. Importers, exporters and manufacturers of metals, chemicals, gases, plastics, etc. Directors: Pablo B. Bataller (Barcelona) and Mrs. Helen M. Weitzkorn. Reg. office: Imperial House, Dominion Street, E.C.2.

T. Dryden, Ltd.

Private company. (486,779). Capital £15,000. To acquire the business of a dealer in chemicals, acids and scientific apparatus and a laboratory furnisher carried on by Thomas A. Dryden at Landore, Swansea, as "T. Dryden." Directors: Thomas A. Dryden, C. A. Dryden and A. E. Dryden. Reg. office: Greenfield Chemical Works, Landore, Swansea.

Euxton Seals, Ltd.

Private company. (486,855). Capital £500. Manufacturers, producers and designers of stoppers, corks, sealings, closures, discs, etc. Directors: J. C. Watkinson and D. Ashworth. Reg. office: 109a Eldon Street, Preston.

Hundred Percent Chemical Products Co., Ltd.

Private company. (485,838). Capital £100. Exporters, importers and manufacturers of chemical materials and products used in the motor and engineering trades, degreasers, etc. Directors: H. W. C. Airey, and R. H. Stevens. Reg. office: Rex House, 38 King William Street, E.C.4.

Jones Lane & Co., Ltd.

Private company. (485,448). Capital £5000. Colliery proprietors, exporters and importers of coal and salt; dealers in petroleum and other mineral oils, etc. Subscribers: A. G. Jones, 8 Sutherland Avenue, Orpington, Kent, and Chas. J. S. King, St. Ermins, S.W.1. Reg. office: 16 Catherine Place, S.W.1.

Keystone Chemicals (Ireland), Ltd.

Private company. (13,521). Capital £100. Chemical manufacturers, agricultural, pharmaceutical and industrial chemists, etc. Subscriber: H. W. Fey, 33 Victoria Road, Rathgar, Dublin, manager.

Paul V. Kutiak Co., Ltd.

Private company. (486,967). Capital £110. Importers, exporters, manufacturers and dealers in chemicals, oils, spices, textiles, furs, plastics, ferrous and non-ferrous metals etc. Directors: Paul V. Kutiak and Mrs. Sonia Kutiak. Reg. office: 30, York Avenue, London, S.W.14.

Mersol Manufacturing Co., Ltd.

Private company. (486,647). Capital £500. Manufacturers of cleansing materials and compounds, detergents, bleaching powders, etc. Directors: K. G. Cleminson and A. E. Cramp. Reg. office: Cliffe Works, Rugby Road, Leamington Spa.

Metalconomy, Ltd.

Private company. (486,504). Capital £100. Manufacturers of chemicals for paints, varnishes, anti-oxidants, passivators, metal treatment, etc. Directors: L. P. K. Oldale and A. E. Rabin. Reg. office: 67 Moorgate, E.C.2.

Metcalf Waring & Co., Ltd.

Private company. (485,287). Capital £5000. To acquire the business of chemical manufacturers carried on by Metcalf & Co. at Miles Platting, Manchester, and to carry on the business of pitch manufacturers and blenders, cable and mineral wax manufacturers, etc. Directors: K. Waring, C. R. Metcalf, and J. Prior. Reg. office: Victoria Chemical Works, Clifton Street, Miles Platting, Manchester.

Micafine, Ltd.

Private company. (487,130). Capital £200,000. Processing mica and other minerals, ores and deposits and by-products, etc. Solicitors: Grundy Kershaw & Co., 31 Booth Street, Manchester.

Organic Dyestuffs (Exports), Ltd.

Private company. (486,884). Capital £1000. Manufacturers of dyestuffs, pigments, chemicals, etc. Directors: R. H. Rylatt and T. Rylatt. Reg. office: Loyal Arcade, 76 Mostyn Street, Llandudno.

Produce Supply Co. (Glasgow), Ltd.

Private company. (27,925). Capital £100. Analytical and consulting chemists, etc. Subscribers: B. Corner and J. M. Balfour, 172 St. Vincent Street, Glasgow.

A. L. Smith (London Road), Ltd.

Private company. (486,672). Capital £2000. Consulting, analytical, manufacturing, pharmaceutical and general chemists, etc. Directors: A. L. Smith and R. W. Addy. Reg. office: 35 London Road, Coventry.

Next Week's Events

SATURDAY, OCTOBER 28

Electrodepositors' Technical Society

London: Hyde Park Hotel, Knightsbridge, S.W.1. 7 p.m. until midnight. Dinner Dance.

MONDAY, OCTOBER 30

Pharmaceutical Society of Great Britain

London: 17 Bloomsbury Square, W.C.1, 7.30 p.m. "The Society's Educational Policy." C. W. Maplethorpe, Ph.C.

Incorporated Plant Engineers

Leeds: University, 7.30 p.m. F. W. Mills: "Steam."

TUESDAY, OCTOBER 31

Royal Institute of Chemistry

Leeds: University, 6.30 p.m. (With the University Chemical Society). Dr. D. W. Kent-Jones: "Why Flour Improvers Are Used. The Agene Problem."

Hull Chemical & Engineering Society

Hull: Church Institute, Albion Street, 7.30 p.m. H. Kay: "Ultramarine."

Society of Instrument Technology

London: Manson House, Portland Place, W.1, 6.30 p.m. A. R. Aikman: "The Frequency Response Approach to Automatic Control Problems."

WEDNESDAY, NOVEMBER 1

Royal Institute of Chemistry

Newport: (with SCI). H. A. Vodden: "The Scattering of Light by Small Particles and Some Applications to Colloid Chemistry."

Institution of Electrical Engineers

Middlesbrough: Cleveland Scientific and Technical Institute, 6.30 p.m. D. B. Hogg: "Some Notes on Electrical Installations in Large Chemical Factories."

British Association of Chemists

Liverpool: Radiant House, Bold Street, 7 p.m. Short illustrated lectures.

Society of Public Analysts and Other Analytical Chemists

London: Burlington House, Piccadilly, W.1, 7 p.m. W. Westwood: "Chemical Determination of Magnesium in Cast Iron"; W. McCamley, T. E. L. Scott and R. Smart: "Determination of Sodium in Aluminium and its Alloys by Vacuum Distillation"; R. M. Black: "Determination of Lead Oxide in the Presence of Lead."

British Ceramic Society

London: 90 Buckingham Palace Road, S.W.1. Two-day autumn meeting of the Refractory Materials Section. Chairman: W. Boyd Mitchell.

THURSDAY, NOVEMBER 2

The Chemical Society

Bristol: University, 7 p.m. (Joint meeting with RIC and SCI). Dr. J. S. Anderson: "The Hahn Emanation Technique."

London: Burlington House, Piccadilly, W.1. Symposium: "Tropolones and Allied Compounds," introduced by Prof. J. W. Cook. Afternoon session: 2.30 p.m., evening 7.30 p.m. Among the papers delivered will be "Thujaplicins," by H. Erdtman and "Ultra-violet Absorption," by Mrs. G. Aulin-Erdtman of Stockholm.

Nottingham: University, 6.30 p.m. (With the University Chemical Society). Prof. C. W. Shoppee: "The Cortisone Problem."

Royal Institute of Chemistry

Brighton: Technical College, 7 p.m. D. Mahon: "The Nature of Plastics" (with film).

Liverpool: University, 7 p.m. Dr. J. B. Firth: "Some Applications of Science in the Detection of Crime."

Society of Chemical Industry

Nottingham: Gas Showrooms, 7.15 p.m. J. N. Fears: "Brown *v.* White Bread."

The Royal Society

London: Burlington House, Piccadilly, W.1, 4.30 p.m. W. K. Burton and N. Cabrera: "Equilibrium Structure of Crystal Surfaces"; W. K. Burton, N. Cabrera and F. C. Frank: "A Theory of Growth of Real Crystals."

Institute of Metals

Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. "Refractories."

Leeds Metallurgical Society

Leeds: University, 7 p.m. "Modern Welding Practice."

Liverpool Metallurgical Society

Liverpool: City Technical College, Byrom Street, 7 p.m. H. G. Taylor: "Recent Work of the British Welding Research Association."

Mineralogical Society

London: Burlington House, Piccadilly, W.1, 5 p.m. Papers include: K. Norrish: "Priderite, a New Mineral from the Leucite Lamproites of the West Kimberly Area, Western Australian"; and Dr. G. F. Claringbull: "New Occurrences of Duftite."

(continued at foot of next page

Chemical and Allied Stocks and Shares

BUSINESS in stock markets has been well maintained and prices have again shown an upward trend. British Funds have been active on the terms of the latest gilt-edged issue and a number of surprise dividend increases helped sentiment in the industrial sections. It is not expected that the new Chancellor of the Exchequer will relax the dividend limitation request. Sentiment in the industrial sections tended to be affected by the new Chancellor of the Exchequer's indication that, as a result of rearmament demands, direction of labour and allocation of raw materials may again have to be re-imposed.

Reflecting the better trend in markets, chemical and kindred shares have been firmer and generally rather more active, although in most cases prices movements have been small on balance. Imperial Chemical were firm at 42s. 7½d., Monsanto 10s. shares 51s., and Fisons moved up to 28s., being helped by hopes of a dividend of 9 per cent, on which basis there would be an attractive yield. Albright & Wilson remained at 30s., Boake Roberts at 31s. 6d. and Brotherton 10s. shares at 20s. 6d. Amber Chemical 2s. shares were 2s. 9d., F. W. Berk 11s. 9d., Bowman Chemical 5s. 3d., Pest Control 7s. 4½d., Laporte Chemicals 5s. units 10s. 4½d., and Lawes Chemical 10s. shares 10s. 6d.

British Oxygen have eased to 90s. 6d. on the big new issue, although the market believes there are excellent prospects of the dividend being maintained in future despite the larger capital. Turner & Newall have been active around 85s. on continued market hopes of higher dividend possibilities. United Glass Bottle showed firmness at 76s. 3d. and Triplex Glass have been active around the higher level of 28s. There was a sharp advance in Dunlop Rubber to 65s. 3d. Lever and Unilever debentures touched the new high level of 30s. premium and the ordinary units were steady at 44s.

The 4s. units of the Distillers Co. were active around 19s. 7½d. United Molasses were firm at 47s. and British Glues strengthened to 21s., after easing, and closed on 20s. Despite the record profits and raising of the dividend from 8 per cent to 10 per cent, British Celanese shares came in for profit taking and eased to 24s. 6d. Calico Printers remained active and higher on the good results announced, with the increased payment of 12½ per cent against the previous year's 8 per cent. Courtaulds at 41s. 3d. were active on talk of higher dividend possibilities.

Iron and steels remained generally steady although not active. Shares of companies not under the nationalisation threat tended to move higher, Guest Keen, for instance, were 46s. 6d., and Babcock & Wilcox 64s. 9d.

Glaxo Laboratories were higher at 53s., De La Rue steady at 24s. 6d., Kleeman 1s. shares 10s. 4½d. and British Industrial Plastics 2s. shares 6s. 1½d. Boots Drug showed firmness at 49s. Borax Consolidated at 55s. were well maintained, and British Aluminium eased slightly to 44s. 3d. Associated Cement at 84s. 3d. also failed to hold best levels. Pinchin Johnson and Goodlass Wall, at 42s. 9d. and 37s. 9d. respectively, were well maintained. Oils turned uncertainly, Anglo-Iranian being slightly lower at £6 10s. and Shell 64s. 4½d.

NEXT WEEK'S EVENTS

(continued from previous page)

FRIDAY, NOVEMBER 3

The Chemical Society

St. Andrews: University, 5 p.m. (With the University Chemical Society). Professor J. N. Davidson: "Chemical Aspects of the Cell Nucleus."

Royal Institute of Chemistry

Stockton-on-Tees: William Newton School, Junction Road, Norton, 7.30 p.m. Professor F. A. Paneth: "Meteorites."

Society of Chemical Industry

Glasgow: Royal Technical College, George Street, 7.15 p.m. Dr. T. Currie: "Ion Exchange Materials."

Pharmaceutical Society

Hull: Imperial Hotel, 8 p.m. Dr. E. Lester Smith: "Vitamin B_{12}—Recent Developments."

SATURDAY, NOVEMBER 4

Royal Institute of Chemistry

Reading: University, 2.30 p.m. Dr. D. W. Scott Blair: "Recent Developments in Rheology."

Institution of Chemical Engineers

Manchester: Reynolds Hall, College of Technology, 3 p.m. C. G. H. Hands and F. R. Whitt: "Glass Lined Equipment Used for the Preparation of Organic Compounds"; E. Barton and Miss E. V. Williams: "Experimental Determination of Jacket Film Heat Transfer Coefficients for Merrill Oil, Dowtherm and Tetracresyl Silicate."

Prices of British Chemical Products

Competitive Conditions in the Home and Export Markets

FAIRLY brisk trading conditions continue generally on the industrial chemicals market, with a good demand for most items for both home and export use. Buyers are giving increasing attention to forward contracts and in consequence spot supplies are likely to become more difficult. There have been no further important price changes at the time of this report but the general tone of the market is strong and further price adjustments would not be unexpected. Makers' deliveries of the routine soda compounds have been well maintained and offers of the potash products are being fully absorbed. Arsenic, hydrogen peroxide and formaldehyde are items in good request. There has been no change in the firm conditions of the coal tar products market and no improvement in the drums supply position which is becoming a serious obstacle to export trade.

MANCHESTER.—The Manchester chemical market maintains its firmness in almost all sections and there has been a fresh advance in sulphate of copper to £62 15s. per ton, f.o.b. Home-trade consumers of the alkalis and other leading lines are specifying for good deliveries and a fair amount of replacement buying covering a wide range of products has been experienced during the past few days. Fresh inquiries from shippers have also been on a fair scale. A quietly steady business has been placed in fertilisers and most of the tar products continue to be taken up in fair quantities.

Price Changes

Rises: Acetic acid, acetic anhydride, industrial alcohol, ammonium persulphate, amyl acetate, antimony oxide, arsenic, butyl acetate butyl alcohol, citric acid, copper carbonate, copper sulphate, ethyl acetate, methylated spirit, tartaric acid, zinc oxide, lithopone, cresylic acid, compound fertilisers.

General Chemicals

Acetic Acid.—Per ton: 80% technical, 1 ton, £69; 80% pure, 1 ton, £74; commercial glacial 1 ton, £82; delivered buyers' premises in returnable barrels; in glass carboys, £7; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £118 per ton.

Acetone.—Small lots: 5 gal. drums, £90 per ton; 10 gal. drums, £85 per ton. In 40/45 gal. drums less than 1 ton, £70 per ton; 1 to 9 tons, £69 per ton; 10 to 50 tons, £68 per ton; 50 tons and over, £67 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 5d. per proof gallon; 5000 gal. lots, d/d, 2s. 6½d. per proof gal.

Alcohol, Diacetone.—Small lots: 5 gal. drums, £133 per ton; 10 gal. drums, £128 per ton. In 40/45 gal. drums: less than 1 ton, £113 per ton; 1 to 9 tons, £112 per ton; 10 to 50 tons, £111 per ton; 50 to 100 tons, £110 per ton; 100 tons and over, £109 per ton.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER: Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non returnable drums; 1 ton lots £47 per ton.

Ammonium Carbonate.—1 ton lots; MANCHESTER: Powder, £52 d/d.

Ammonium Chloride. — Grey galvanising, £27 10s. per ton, in casks, ex wharf. Fine white 98%, £21 10s. to £22 10s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate. — MANCHESTER: £5 2s. 6d. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Amyl Acetate.—In 10-ton lots, £179 10s. per ton.

Antimony Oxide.—£200 per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots, as to grade, etc., 1s. 9½d. to 2s. 4½d. per lb. Crimson, 2s. 6½d. to 3s. 3½d. per lb.

Arsenic.—Per ton, £44 5s. to £47 5s., ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £27 5s. per ton, bag packing, ex works.

Barium Chloride.—£35 to £35 10s. per ton

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £29 10s. per ton d/d; 2-ton lots, £29 15s. per ton.

Bleaching Powder.—£19 10s. per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140 lb. bags, carriage paid: Anhydrous, £54; in 1-cwt. bags, commercial, granular, £34 10s.; crystal, £37; powder, £38, extra fine powder, £39; B.P., granular, £44; crystal, £46; powder, £48-£48 10s.; extra fine powder £48.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granular, £62; crystal, £69; powder, £66 10s.; extra fine powder, £68 10s.; B.P., granular, £75 10s.; crystal, £81; powder, £78 10s.; extra fine powder, £80 10s.

Butyl Acetate BSS.—£156 10s. per ton, in 10-ton lots.

Butyl Alcohol BSS.—£143 per ton, in 10-ton lots.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid £9 12s. 6d. per ton, in 4 ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 6d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 7d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Cobalt Oxide.—Black, delivered, 9s. 10d. per lb.

Copper Carbonate.—MANCHESTER: 2s. per lb.

Copper Chloride.—(63 per cent), d/d, 2s. 2d. per lb.

Copper Oxide. — Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(63 per cent), d/d, 2s. 1d. per lb.

Copper Sulphate.—£60 2s. 6d. to £62 15s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £7 2s. per 10 cwt. lot, d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £114 per ton.

Formaldehyde.—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.

Formic Acid.—85%, £66 to £67 10s. per ton, carriage paid.

Glycerin.—Chemically pure, double distilled 1260 s.g. 128s. per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; bulk carriage paid.

Hydrochloric Acid.—Spot, 7s. 6d to 8s 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 18s. per lb. in cwt. lots.

Iodoform.—21s. per lb.

Iron Sulphate.—F.o.r. works, £3 15s. to £4 per ton.

Lactic Acid.—Pale tech., £85 per ton; dark tech., £75 per ton ex works; barrels returnable.

Lead Acetate.—Nominal.

Lead Carbonate.—Nominal.

Lead Nitrate.—Nominal.

Lead, Red.—Basis prices per ton: Genuine dry red lead, £146; orange lead, £158. Ground in oil: red, £166; orange, £178.

Lead, White.—Basis prices: Dry English, in 8-cwt. casks, £153 10s. per ton. Ground in oil: English, under 2 tons, £170 10s.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d. £22 to £25 per ton.

Litharge.—£146 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light, commercial, d/d, £74 5s.; cwt. lots £82 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light, commercial, d/d, £187; cwt. lots £192 10s. per ton d/d.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 8s. 5d.; smaller quantities dearer

Mercurous Chloride.—9s. 4d. per lb., (28 lb. lots).

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 4s. 2d. per gal.; pyridinised 64° O.P. 100 gal., 4s. 4d. per gal.

Nickel Sulphate.—F.o.r. works, 3s. 4d. per lb. (Nominal.)

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—About £133 per ton packed in free 5-cwt. casks.

Paraffin Wax.—From £58 10s. to £101 17s. 6d., according to grade for 1 ton lots.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £63 10s. per ton; B.P. (S.G.1.750), ton lots, carriage paid, 1s. 1½d. per lb.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 9⅝d. per lb.; ground, 10⅝d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iodide.—B.P., 15s. 5d. per lb.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 6d. per lb.; technical, £6 13s. to £7 13s. per cwt.; according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—Dog-tooth crystals, £72 10s per ton; medium, £67 10s. per ton; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid.—MANCHESTER: 2s. to 3s. 4½d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic. — Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£41-£55 per ton.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £29 12s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£52 to £57 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite. — Pea crystals £23 2s. 6d. a ton; commercial, 1-ton lots, £21 12s. 6d. per ton carriage paid.

Sodium Iodide.—B.P., 16s. 9d. per lb, in cwt. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £101 10s. ton.

Sodium Metasilicate.—£19 to £19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £23 per ton.

Sodium Nitrite.—£29 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 17s. 9d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots: Di-sodium, crystalline, £32 10s., anhydrous, £65; tri-sodium, crystalline, £32 10s., anhydrous, £64.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 10s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot. £25 15s. per ton, d/d, in drums; broken, £27 5s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £15 11s. 6d. to £17 16s. 6d. according to fineness.

Sulphuric Acid.—160° Tw., £6 16s. to £7 16s. per ton; 140° Tw., arsenic free £5 10s. per ton; 140° Tw., arsenious, £5 2s. 6d. per ton; Quotations naked at sellers' works.

Tartaric Acid.—Per cwt: 10 cwt. or more £9.

Tin Oxide.—1-cwt. lots d/d £25 10s. (Nominal.)

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags) £102 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d; white seal, £142; green seal, £141; red seal, £139 10s.

Zinc Sulphate.—Nominal.

Rubber Chemicals

Antimony Sulphide.—Golden, 4s. to 5s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £11-£11 10s. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£59 10s. per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5½d. per lb.; dark, 10½d. to 1s. per lb.

Lithopone.—30%, £44 2s. 6d. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £12 11s.

Compound Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. Special No. 1, £20 1s. 6d.

"Nitro-Chalk."—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean for 6-ton lots d/d nearest station, £19 17s. 6d. per ton.

Coal-Tar Products

Benzol.—Per gal, ex works: 90's, 3s. 3d.; pure, 3s. 5½d.; nitration grade, 3s. 7½d.

Carbolic Acid.—Crystals, 10½d. to 1s. 0½d. per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 11½d. to 1s. 1½d. per lb., d/d crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 6½d. to 9½d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9½d. per gal.

Cresylic Acid.—Pale 98%, 3s. 3d. per gal.; 99.5/100%, 3s. 11d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, American, duty free, 7s. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £9 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 90s. per ton f.o.r. suppliers' works; export trade, 110s. per ton f.o.b. suppliers' port. MANCHESTER: £5 10s. f.o.r.

Pyridine.—90/160°, 22s. 6d. MANCHESTER: 20s. to 22s. 6d. per gal.

Toluol.—Pure, 3s. 2½d. per gal. MANCHESTER: Pure, 3s. 2d. per gal. naked.

Xylol.—For 1000-gal. lots, 4s. 0½d. to 4s. 8d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON: October 23. The prices of all refined oils and imported edible animal fats remain unchanged for the eight-week period ending December 2. The prices of all unrefined oils and fats and technical animal fats remain unchanged during the five-week period ending November 4.

Less Copper for Sulphate

THE probability that shortage of scrap copper, much of which was being used for ingot production and rearmament, would enforce a reduction of copper sulphate production and exports, was foreseen by Mr. J. D. McKechnie, chairman of the British Sulphate of Copper Association, Ltd., at the 26th annual general meeting in London on Wednesday. He disclosed that total exports for 1949-50 were 43,391 tons, as compared with 34,988 tons in the previous year.

British Plant for India

MR. R. E. G. WINDSOR (R. H. Windsor, Ltd., plastics machinery manufacturers, London) is now on a brief visit to India for the study of the plastic requirements of the large market there. He is also expected to visit Pakistan on the completion of his tour of India. The company now has a branch office in Bombay under the name of R. H. Windsor (India), Ltd., and a London-trained expert is already in Bombay to take charge of the servicing department. The next step will be the manufacture of moulds according to the requirements of Indian manufacturers. The last stage will be the manufacture of machines in India itself.

CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

THE INSTITUTION
of
CHEMICAL ENGINEERS

EXAMINATION, 1951

Application forms, (returnable 1st December, 1950) and particulars of the Associate-Membership Examination for 1951 may be obtained from the Hon. Registrar, **INSTITUTION OF CHEMICAL ENGINEERS, 56, VICTORIA STREET, WESTMINSTER, LONDON, S.W.1.**

SITUATIONS VACANT

CHEMICAL ENGINEER required for old-established London Firm of Chemical Engineers. University Degree, A.M.I.Chem.E. or equivalent, and experience in Heavy Chemical Industry, especially design or operation Sulphuric Acid Contact Plant, desirable but not essential. Salary according to qualifications and experience. Pension Fund. Write, Box No. C.A. 2955, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

CHIEF RESEARCH CHEMIST. Heavy organic chemical manufacturing company need a Chief Research Chemist to take charge of expanding research department. Appropriate experience is essential and the salary will be £1,500 or over according to applicants ability and qualities. A suitable house will be made available if necessary. Reply to Box No. C.A. 2954, THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

THE CIVIL SERVICE COMMISSIONERS invite applications from **MECHANICAL ENGINEERS** for a permanent appointment in the grade of **DEPUTY CHIEF SCIENTIFIC OFFICER,** at a Research and Development Establishment near London, to take charge of all the engineering groups in the Establishment. The duties include the general supervision of mechanical engineering workshops, mainly of the tool-room type, electronics workshops and design and drawing office sections, as well as the site maintenance of a variety of engineering services. The function of the design and drawing office sections is to provide a wide range of mechanical and electronic equipment and apparatus for use in the research, development and prototype-plant sections of the Establishment, some of which are chemical engineering in character.

Candidates must have been born on or before August 1st, 1919, and have First or Second-Class Honours Degree in Mechanical Engineering or equivalent qualification, together with suitable first-class practical experience.

Salary scale (male), £1,750-£2,025. Rates for women somewhat lower. Post carries benefits under Federated Superannuation System for Universities.

Housing accommodation will be available for the selected applicant.

Particulars and application forms from the **Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1, quoting No. 3324.** Completed application forms must be returned by November 16th, 1950.
8783/120/WP

FOR SALE

VARIOUS MIXERS FOR SALE

BAND CONVEYOR, 50 ft. long 40 in. wide, steel frame, motorised, for boxes, cases, bags, etc.

A FILTER PRESS, 31½ in. square, fitted with 42 C.I. plates, centre fed.

FILTER PRESS, 25 in. square, fitted with 24 plates, cast iron built and steam heated.

Four **GARDNER HORIZONTAL MIXERS,** for powders, from 100 lbs. to 250 lbs. capacity, all motorised, three with Radicon Reduction Gear Boxes and one with a Spur Gear Drive.

Two large unjacketed **WERNER MIXERS,** belt and gear driven, hand tipping, double "Z" arms, pans 53 in. by 45 in. by 36 in. deep.

No. 200 One nearly new **WERNER PFLEIDERER JACKETED MIXER OR INCORPORATOR.** Low type, with C.I. built mixing chamber, 28 in. by 29 in. by 27 in. deep, with double "U"-shaped bottom which is jacketed, and double fish-tail or fin-type agitators geared together at one side, with belt-driven friction pulleys, 34 in. diam. by 5 in. face, with hand-wheel operation and hand-operated screw tilting gear. Machine fitted with machine-cut gears, covers, gear guard, cast-iron baseplate, and measuring overall approximately 7 ft. by 6 ft. by 4 ft. high to the top of the tipping screw.

No. 204 One **WERNER PFLEIDERER MIXER OR INCORPORATOR,** similar to the above, with a C.I. built pan 25 in. by 25 in. by 19 in. deep, belt pulleys 26 in. diam. by 5 in. face, double fin-type agitators, and mounted on C.I. legs.

No. 208 One **DITTO** by **WERNER PFLEIDERER,** with a C.I. built pan or mixing chamber, of the double "U" type, 4 ft. 5 in. long by 2 ft. 8 in. by 33 in. deep, with double "Z" mixing arms, gears at each end, hand-operated tilting gear, with steel backframe, counterbalancing weights and chains, and fast and loose pulleys 3 ft. diam. by 6 in. face.

No. 209 One **HORIZONTAL "U"-SHAPED MIXER,** steel built, riveted, measuring about 8 ft. 3 in. long by 3 ft. wide by 3 ft. 3 in. deep, with horizontal shaft, fitted with bolted-on mixing arms about 18 in. long by 4 in. wide, with intermediate breakers, and driven at one end by a pair of spur gears, with countershaft, fast and loose belt pulleys, outer bearing and plug cock type outlet at the opposite end, mounted on two cradles fitted to two R.S.J. running from end to end.

No. 210 One **HORIZONTAL MIXER** as above.

No. 211 One **HORIZONTAL MIXER** as above.

These three "U"-shaped mixers are in some cases fitted with steel plate covers and a steam jacket round the bottom and extending to within about 18 in. of the top with plain end plates.

Further details and prices upon application.

Write RICHARD SIZER LIMITED, ENGINEERS, CUBER WORKS, HULL

FOR SALE

600

UNUSED **GARDNER** mixer size 'M,' 2 tons cap., 12 ft. long by 4 ft. wide by 4 ft. 5 in. deep. With cover sacking-off head, etc. Driven by 26 h.p. B.T.H. S/R motor, 400/3/50.

BRITISH JEFFREY DIAMOND, 20 in. by 16 in. **CRUSHER,** cap. approx. 5 tons per hr., crushing 2 in. to ½ in. and less. Vee belt driven by 10 h.p. E.E.C., S/R motor, 440/3/50 together with: 14 in. wide trough rubber belt conveyor approx. 27 ft. centres, complete with 3 h.p. motor by E.E.C. 440/3/50.

Twin roll **FLAKING MACHINE** by **BERTRAM,** with C.I. rolls 60 in. long by 28 in. diam. Drive through helical gearing from 4.5 h.p. reduction gearbox, ratio 160/35, with 24 in. diam. by 6 in. face pulley. Rolls suitable 40 lb. sq. in. safe w.p.

2 complete **DEHYDRATION PLANTS** by **AIRSCREW,** comprising double compartment tunnel type drying ovens. Each unit holds 4 trucks each carrying 50 trays, 2 ft. by 4 ft. and capable of carrying 30 lb. max. material in wet condition, with moisture content of 46 per cent max. Steam heated by gilled tube radiator working at 100 lb. sq. in. Complete with all control gear and recording instruments.

SOLVENT extraction plant, comprising steam coil heated boiling vessel 2 ft. diam. by 2 ft. 6 in. deep with 4 in. vapour pipe connected to coil condenser, catch pot connected by jacketed piping to extractor vessel 2 ft. 6 in. diam. by 10 ft. deep. Shell and tube condenser 9 in. diam. with 5 tubes 3 ft. 6 in. long by 3 in. diam.

4 **JACKETED MIXERS** by **BAKER PERKINS,** trough 31 in. by 28½ in. by 28 in., twin fin or naben type blade agitators. Tilting through vert. back lead screw by hand wheel. Trough fitted aluminium cover with securing bolts. Direct driven by 3 h.p. T.E. geared motor by B.T.H. 400-440/3/50. 1,450 r.p.m. Forward and reversing switch by Brookhirst.

GEORGE COHEN, SONS & CO.
SUNBEAM ROAD, LONDON, N.W.10.
Tel.: Elgar 7222 and
STANNINGLEY, Nr. LEEDS.
Tel.: Pudsey 2241.

CHARCOAL, ANIMAL and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES. LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams, "Hilljones, Bochurch, London," Telephone: 3285 East.

JACKETED "Werner" **MIXER** with tipping pan, 29 in. by 29 in. by 22 in. deep with double fin blades "**WERNER**" **MIXER** with tipping pan, 33 in. by 33 in by 24 in., with double Z-blades.

Gunmetal **FILTER PRESSES,** with six plates and frames to give a 9-in. cake.

Horizontal Enclosed **ALUMINIUM TANKS,** 200, 300 and and 500 gallons capacity.

Jacketed **STILL,** tinned brass, 10-gallon capacity, with condenser and receiver.

Jacketed Vacuum **STILLS** with agitators in mild steel, 200, 300 and 500-gallons capacity.

Horizontal Wet **VACUUM PUMP,** single cylinder, 10 in. by 9 in., motor drive.

Horizontal Dry **VACUUM PUMP,** single cylinder, 12 in. by 10 in., belt drive.

"Lang" **MIXER, EMULSIFIER** and **DISINTEGRATOR,** rotor 14 in. diam., container 50 gallons; all working parts enamelled.

"Gardner" **MIXERS,** 60, 100 and 200 lb. capacity.

DARTNALL,
248, Humberstone Road,
Plaistow, London, E.13.

FOR SALE

PHONE 98 STAINES

"SIMON" **DRYER** with steam-heated revolving tubes, 90 sq. ft. area.

"Torrance" Elec. Positive Drive Edge **RUNNER,** 5 ft. dia. bed.

"Baker Perkins" Elec. 5-roll Steel **REFINERS.**

1,000-gallon Riveted Steel-Jacketed **PAN.**

3 Wood zinc-lined **POWDER BLENDERS,** 3 cu. ft. each.

HARRY H. GARDAM & CO., LTD.,
STAINES

THIODIGLYCOL. Any quantity from a single 45 gallon drum up to 100 tons. **SODIUM LACTATE** 50% **TECHNICAL DARK,** any quantity from a single 45 gallon drum up to 30 tons. WILLIAMS, 203, Albany Street, London, N.W.1. EUSton 4804.

3 M.S. Welded Jacketed **PANS,** 24 in. diam. by 26 in. deep, 1½ in. bottom outlet, mounted on angle legs. Tested 100 lb. hydraulic pressure.

THOMPSON & SON (MILLWALL) LIMITED
CUBA STREET, LONDON, E.14.
Tel.: East 1844.

8 COPPER-jacketed **MELTING PANS,** 18 in. diam, by 12 in. deep, fitted covers, mounted in M.S. frames, 25 in. by 25 in. by 44 in. high, with flanged fittings' valves and steam traps. As new.

THOMPSON & SON (MILLWALL) LIMITED,
CUBA STREET, LONDON, E.14.
Tel.: East 1844.

9 EXCELLENT
ALL WELDED STORAGE TANKS
19 ft. by 8 ft. diam. by ¾ in. Plate.
DISH-ENDED TYPE.
CAPACITY, 5,500 Gallons.
MADEN & McKEE, LTD.,
317, Prescot Road,
Liverpool, 13.

190-GALLON **MILD STEEL RESIN STILL** or **REACTION VESSEL** 4 ft. 6 in. dia. by 3 ft. 3 in. deep. Stirring gear; steam coils externally.

1000-gallon **ALUMINIUM TOTALLY ENCLOSED VERTICAL STORAGE TANK,** lagged externally and aluminium sheeted.

Unused 8-gallon Baird & Tatlock **VACUUM STILL** 5 section fractionating column, Pulsometer Motor driven pump and all equipment. Delivery from stock.

REED BROTHERS (ENGINEERING), LTD.
Replant Works, Cuba Street,
MILLWALL, E14.

1000 STRONG NEW WATERPROOF APRONS. To-day's value 5s. each, Clearing at 30s, dozen. Also large quantity Filter Cloths, cheap. Wilsons, Springfield Mills, Preston, Lancs Phone 2198.

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CRUSHING, GRINDING, MIXING and DRYING for the trade.
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